NPS Form 10-900
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United States Department of the Interior
National Park Service

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NAT. REGISTER OF HISTORIC PLACES
NATIONAL PARK SERVICE

National Register of Historic Places Registration Form

This form is for use in nominating or requesting determinations for individual properties and districts. See instructions in *How to Complete the National Register of Historic Places Registration Form* (National Register Bulletin 16A). Complete each item by marking "x" in the appropriate box or by entering the information requested. If any item does not apply to the property being documented, enter "N/A" for "not applicable." For functions, architectural classification, materials, and areas of significance, enter only categories and subcategories from the instructions. Place additional entries and narrative items on continuation sheets (NPS Form 10-900a). Use a typewriter, word processor, or computer, to complete all items.

1. Name of Property

historic name Kimball Village

other names/site number site 13PM4; Kimball Village Site; Kimball; Kimball Site; Kimball Mound

2. Location

street & number [redacted] ☒ not for publication

city or town [redacted] ☒ vicinity

state Iowa code IA county Plymouth code 149 zip code 51062

3. State/Federal Agency Certification

As the designated authority under the National Historic Preservation Act of 1986, as amended, I hereby certify that this ☒ nomination ☐ request for determination of eligibility meets the documentation standards for registering properties in the National Register of Historic Places and meets the procedural and professional requirements set forth in 36 CFR Part 60. In my opinion, the property ☒ meets ☐ does not meet the National Register Criteria. I recommend that this property be considered significant ☒ nationally ☒ statewide ☒ locally. (☐ See continuation sheet for additional comments.)

Barbara A. Mitchell DSHPO April 16 2010
Signature of certifying official/Title Date

STATE HISTORICAL SOCIETY OF IOWA
State or Federal agency and bureau

In my opinion, the property ☐ meets ☐ does not meet the National Register criteria. (☐ See continuation sheet for additional comments.)

Signature of commenting or other official Date

State or Federal agency and bureau

4. National Park Service Certification

I hereby certify that this property is:

☑ entered in the National Register
☐ See continuation sheet.
☐ determined eligible for the National Register
☐ See continuation sheet.
☐ determined not eligible for the National Register
☐ removed from the National Register
☐ other (explain): _____

for Erika K. Martin Gubat — 6/11/10
Signature of the Keeper Date of Action

Kimball Village
Name of Property

Plymouth County, Iowa
County and State

5. Classification

Ownership of Property
(Check as many boxes as apply)

- ☒ private
- ☐ public-local
- ☐ public-State
- ☐ public-Federal

Category of Property
(Check only one box)

- ☐ building(s)
- ☐ district
- ☒ site
- ☐ structure
- ☐ object

Number of Resources within Property
(Do not include previously listed resources in the count.)

Contributing	Noncontributing	
		buildings
1		sites
		structures
		objects
1	0	Total

Name of related multiple property listing
(Enter "N/A" if property is not part of a multiple property listing.)

Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa

Number of contributing resources previously listed in the National Register

0

6. Function or Use

Historic Functions
(Enter categories from instructions)

DOMESTIC / Village site
COMMERCE / TRADE / Trade
AGRICULTURE / SUBSISTENCE / Processing
AGRICULTURE / SUBSISTENCE / Storage
INDUSTRY / PROCESSING / EXTRACTION / Processing site
FUNERARY / Graves/ burials

Current Functions
(Enter categories from instructions)

AGRICULTURE / SUBSISTENCE / Agricultural field

7. Description

Architectural Classification
(Enter categories from instructions)

n/a

Materials
(Enter categories from instructions)

foundation n/a
roof
walls
other

Narrative Description
(Describe the historic and current condition of the property on one or more continuation sheets.)

Kimball Village — Plymouth County, Iowa

Name of Property — County and State

8. Statement of Significance

Applicable National Register Criteria
(Mark "x" in one or more boxes for the criteria qualifying the property for National Register listing)

- ☐ A Property is associated with events that have made a significant contribution to the broad patterns of our history.
- ☐ B Property is associated with the lives of persons significant in our past.
- ☐ C Property embodies the distinctive characteristics of a type, period, or method of construction or represents the work of a master, or possesses high artistic values, or represents a significant and distinguishable entity whose components lack individual distinction.
- ☒ D Property has yielded, or is likely to yield information important in prehistory or history.

Criteria Considerations
(Mark "X" in all the boxes that apply.)

Property is:

- ☐ A owned by a religious institution or used for religious purposes.
- ☐ B removed from its original location.
- ☐ C a birthplace or a grave.
- ☐ D a cemetery.
- ☐ E a reconstructed building, object, or structure.
- ☐ F a commemorative property.
- ☐ G less than 50 years of age or achieved significance within the past 50 years.

Areas of Significance
(Enter categories from instructions)

ARCHEOLOGY / Prehistoric
ETHNIC HERITAGE / Native American
COMMUNITY PLANNING AND DEVELOPMENT

Period of Significance

A.D. 1100–1250

Significant Dates

Significant Person
(Complete if Criterion B is marked above)

n/a

Cultural Affiliation

Big Sioux phase of the Initial variant of the Middle Missouri tradition
Mill Creek culture

Architect/Builder

n/a

Narrative Statement of Significance
(Explain the significance of the property on one or more continuation sheets.)

9. Major Bibliographical References

(Cite the books, articles, and other sources used in preparing this form on one or more continuation sheets.)

Previous documentation on file (NPS):

- ☐ preliminary determination of individual listing (36 CFR 67) has been requested.
- ☐ previously listed in the National Register
- ☐ previously determined eligible by the National Register
- ☐ designated a National Historic Landmark
- ☐ recorded by Historic American Buildings Survey # _____
- ☐ recorded by Historic American Engineering Record # _____

Primary Location of Additional Data

- ☒ State Historic Preservation Office
- ☐ Other State agency
- ☐ Federal agency
- ☐ Local government
- ☒ University
- ☐ Other

Name of repository:

Office of the State Archaeologist at the University of Iowa

Kimball Village | Plymouth County, Iowa

Name of Property | County and State

10. Geographical Data

Acreage of Property 1.9 acres

UTM References
(Place additional UTM references on a continuation sheet)

	Zone	Easting	Northing		Zone	Easting	Northing
1	[redacted]			3			
2				4			

☐ See continuation sheet.

Verbal Boundary Description
(Describe the boundaries of the property on a continuation sheet.)

Boundary Justification
(Explain why the boundaries were selected on a continuation sheet.)

11. Form Prepared By

name/title Cynthia L. Peterson, Lynn M. Alex, and William E. Whittaker / Archaeologists cindy-peterson@uiowa.edu

organization Office of the State Archaeologist, The University of Iowa date April 1, 2010

street & number 700 Clinton Street Building telephone 319-384-0726

city or town Iowa City state IA zip code 52242

Additional Documentation

Submit the following items with the completed form:

Continuation Sheets

Maps

A **USGS map** (7.5 or 15 minute series) indicating the property's location.

A **Sketch map** for historic districts and properties having large acreage or numerous resources.

Photographs

Representative **black and white photographs** of the property.

Additional items
(Check with the SHPO or FPO for any additional items)

Property Owner

(Complete this item at the request of the SHPO or FPO.)

name [redacted]

street & number [redacted] telephone [redacted]

city or town [redacted] st[redacted] zip code [redacted]

Kimball Village (hereafter also referred to as 13PM4) is located on a river valley terrace in the Iowa landform region known as the Loess Hills. Extremely thick deposits of windblown silt accumulated during the Illinoian (Loveland Loess) and Wisconsinan (Pisgah and Peoria loesses) glacial episodes within a long corridor adjacent to and east of the Missouri River valley. Loess deposition slowed considerably after approximately 12,500 years ago. The resulting "intricate, finely sculpted Loess Hills topography is a product of the combined effects of wind deposition, erosional processes along entrenched stream systems, and gravity-induced slumping of thick, fine-grained sediment" (Prior 1991:52–54).

Kimball Village is one of six known Big Sioux phase villages and it is the only one where houses have been fully exposed through archaeological excavation. Despite roughly 150 years of cultivation, historic integrity is high, with over 2.3-m (7.5-ft)-thick deposits of cultural materials present at this midden mound village, the same depth of material as was reported during 1939 and 1963 archaeological excavations at the site. Over 97 percent of the site is untouched by archaeological excavation. Geophysical survey (non-invasive archaeological techniques that reveal subsurface features without digging) indicates that the ruins of at least 20 houses remain as archaeological features. The well-preserved stratigraphic horizons, lodge remnants, storage pits, activity areas, mortuary facilities, and richly diverse artifact assemblage provide research opportunities into various topics related to Late Prehistoric peoples, including contact and trade, the interaction of climate and culture, nucleation of communities, tribal identities, ceramics and food, development of new technologies, origins of the Plains Village pattern, intensification of agriculture, and the prehistoric landscape. The 0.8 hectare (1.9 acre) site is situated on a natural terrace overlooking the Big Sioux River to the west, and in the shadow of the Loess Hills to the east. Presently, the site is under cultivation.

Middle Missouri tradition people represent a culture that spanned the last 800 years within the Prairie-Plains. They lived in villages, sometimes fortified, of tightly clustered earthlodges (Figure 1); hunted bison, and other large and small game, birds, and fish; planted gardens full of domesticated crops, like maize, beans, squash, sunflower, marshelder, goosefoot, and tobacco; gathered wild nutritional and medicinal plants; and had a complex social organization, as evidenced by the layout of their villages, extensive trade networks, and the presence of ceremonial objects within burials. They arose from indigenous, resident Late Woodland societies who were responding to significant economic and social processes occurring throughout the Prairie-Plains region a millennium ago. Once established, the Middle Missouri tradition presented a new phenomenon on the Prairie-Plains—a lifeway based on self-sustaining, sedentary villages and a tribal society that successfully persisted for over eight centuries (Tiffany 2007).

The Middle Missouri tradition extends across the northern Prairie-Plains, concentrated in South and North Dakota. The easternmost and earliest manifestation of the Middle Missouri tradition is found in northwest Iowa, and is often referred to colloquially as the Mill Creek culture or scientifically as the Initial variant, meaning this was the first, or initial, archaeologically distinct appearance of these people in tightly nucleated villages. In Iowa, the Initial variant is divided into two separate phases (Figure 2). The two phases are very similar in village layout, material culture, general subsistence practices, and period of occupation. The

division into two separate phases is mainly geographic, with the Little Sioux phase settlements found along the valleys of Mill, Brooke, and Waterman creeks and the Little Sioux River, in Buena Vista, Cherokee, and O'Brien counties. The Big Sioux phase is concentrated in Iowa's Loess Hills, specifically, along the Big Sioux River and the Broken Kettle and Perry Creek valleys of Plymouth and Woodbury counties. Overland, the heartlands of these two phases are separated by about 80 km (50 miles).

ENVIRONMENTAL SETTING

Severe hillslope and gully erosion, massive valley sedimentation, and stream channel entrenchment during the Holocene have episodically reworked and buried older landscapes. Holocene alluvial valley fills in Iowa are subdivided on the basis of lithology and stratigraphic relationships into the Gunder, Corrington, Roberts Creek, and Camp Creek members of the DeForest Formation (Bettis and Littke 1987). Gunder Member alluvium and Corrington Member alluvial fans may contain Paleo-Indian through Woodland components; Roberts Creek Member deposits may contain Late Archaic through early historic components; and Camp Creek Member alluvium may contain buried and unburied historic archaeological components, and may bury older surfaces. In this thick-loess region, the Gunder Member is further subdivided into the Watkins and Hatcher beds, and the Roberts Creek Member is subdivided to include the Mullenix and Turton Beds (Bettis 1990).

Soils at 13PM4 are mapped as Modale variant. Modale series soils formed in 40–80 cm of silty alluvium and the underlying clayey alluvium. These somewhat poorly drained soils are most often found on floodplains. The Modale series is classified as calcareous, mesic Aquic Udifluvents. Native vegetation was tall grass prairie (Soil Survey Staff 2009; Worster and Harvey 1976).

Keyes (1937) noted that Kimball Village was situated on a terrace, a setting confirmed by Henning et al. (1968:80–81) and Whittaker (2010). Orr (1942:63) mentioned the site was on an alluvial fan spur, but no evidence has been located to support his claim. The site covers 0.8 hectares (1.9 acres) on a broad terrace above the left bank of the Big Sioux River. The toeslope of the Loess Hills bluffs is 200 m (660 feet) east of the site. Today, the left bank of the Big Sioux River is 240 m (790 feet) west of the west edge of the site. It is possible the river bank was nearer the site during late prehistoric times, although there is no obvious abandoned river channel. No detailed geomorphological investigation has yet occurred at the site (Lee 1969); future study of soil strata at Kimball Village holds exciting potential to explain midden formation processes across all Initial variant villages. Pollen data suggests that during late prehistory, the native vegetation at Kimball Village was tall grass prairie, with a nearby stand of timber and thicket (Bryson and Baerreis 1968:16–19; James and Nichols 1969:315). Botanical analysis of wood charcoal from the site identified ash, elm, ironwood, maple, and willow from the assemblage (Henning et al. 1968:38–39).

Today, the entire site is under cultivation, as it has been since at least the 1930s, and probably several decades earlier (Figures 3 and 4). State highway Iowa 12 is 130 m (430 feet) east of the east edge of the site.

PHYSICAL CHARACTERISTICS

Site 13PM4 is a midden mound village of the Big Sioux phase of the Initial variant of the Middle Missouri tradition. "Midden mound" refers to a village that, through a variety of processes, has a human-made, raised appearance resulting in part from the accumulation of village debris and the disintegration of mud-walled houses. At Kimball Village, the midden is roughly 2.3-m (7.5-feet)-deep. Three, possibly four, houses have been archaeologically verified through excavations (Orr 1942). Geophysical survey indicates at least 17 additional houses are present (Kvamme 2009). The number of years this village was occupied is not known with certainty, although artifacts reveal it was only occupied by Initial variant peoples, meaning there was a maximum occupation span of 150 years (A.D. 1100–1250).

Features identified through excavations at the site include post-mold alignments that represent houses, and other post-mold alignments that were not investigated to a great enough degree to determine their function. There were storage pit features associated with all three houses (Figure 5). Central fireplaces were found at two of the houses; the central area of the third house was not explored. One pit was found in association with the exterior of a house. Several houses contained buried human remains (Bryson and Baerreis 1968; Henning, ed.1968, ed. 1969; Orr 1942). Non-invasive geophysical survey (magnetometry) has identified that at least 20 houses, including the three found by Orr, were once present at Kimball Village (Figure 6). Interestingly, Orr (1939d, 1942) estimated that 20 houses were probably present at the site. Kvamme's (2009) geophysical work showed that a curious distribution of small anomalies encircle the village: these may be small holes that once held stout palisade timbers. The geophysical work also shows anomalies that are probably more storage pits, hearths, middens, heavily fired areas, or other activity areas (Kvamme 2009).

Researchers have reported some distinct cultural strata (horizons within the soil) at the site. The dark soils at 13PM4 have made feature definition difficult, except near the base of the midden, where cultural deposits interface with subsoil. As a result, most features have been identified from great depths (between 6 and 7.5 feet below ground surface). Refuse disposal undoubtedly contributed to building up the site depth. However, as detailed in the Multiple Property Documentation Form (MPDF), *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa* (Alex and Peterson 2010:33–34), there are other explanations that help to explain the tell-like visual quality of other Initial variant midden mound villages. Although not documented at Kimball Village, houses at some other sites of the Initial variant of the Middle Missouri tradition exhibit accumulated deposits: later houses were built atop the detritus of earlier ones, soils were banked along exterior house walls, soils blanketing earlier houses washed down and/or were scraped down when houses were rebuilt, and/or soils were imported to raise the village elevation (R. Alex 1973; Anderson 1985, 1986; Baerreis and Alex 1974; Fishel 1995; Lehmer et al. 1973; Tiffany 1982a; Van Nest 1995). Although this aspect of midden formation has been studied along the Little Sioux, no detailed geomorphological investigation has occurred at a Big Sioux phase site, so site formation studies are in their infancy at Kimball Village.

Artifacts from Kimball Village represent the best that could be hoped for when excavating a nearly 1,000-year-old town site. Villagers buried their dead within pits in some houses, stored food in or swept refuse into other pits. All the detritus of village life, some intentionally left behind as trash such as flaking debris, broken pottery, and cooked seeds and fish bones, remained, while other items were inadvertently lost or inadvertently forgotten such as stone tools and possible ceremonial objects, like an elk antler carved into an effigy of a long-necked bird's head.

Presently, Kimball Village is a cultivated farm field, as it has been since the 1930s, and probably since the 1870s. One local retired farmer is known to surface collect the site, with permission from the landowner. Otherwise, the present landowner discourages such activities. Kimball Village remains today about the same as Ellison Orr reported in 1942 (Orr 1942:63): "unknown to but few beside the successive owners or tenants of the farm." Because the Big Sioux River is 240 m (790 feet) west of the site, Kimball Village may occasionally be flooded, but does not see the scouring effects so typical of sites right on a river's edge. The site is far enough removed from the highway (130 m; 430 feet) that road construction has never affected it.

Orr (1942) mentioned the site measured 98 m north-south x 60 m east west (320-x-196-feet). Henning et al. (1968:81), using a transit, found the site measured 122 x 76 m (400-x-250-feet). Given that Orr was a surveyor by trade and Henning an experienced, professional archaeologist, both measurements are equally valid, depending where exactly on the site one is measuring. Also, it is possible that mechanical plowing during the 24 interceding years between the two excavations spread cultural materials over a slightly greater area by 1963. Whittaker's (2010) site dimension measurements conformed to those of Henning et al. (1968).

ALTERATIONS

Known subsurface disturbance at Kimball Village has been restricted to surface artifact collection, normal cultivation practices, and to limited archaeological excavations (discussed in detail in Section 8). Excavations were conducted at Kimball Village in 1939, 1963, and 2009 (Bryson and Baerreis 1968; Henning, ed. 1968, Henning, ed.1969; Orr 1942; Whittaker 2010). The site boundaries encompass 0.8 ha (1.9 acres) and only 0.02 ha (0.05 acres) has been archaeologically excavated (Table 1). Approximately 97 percent of Kimball Village remains untouched by archaeological excavation. Site 13PM4 is exceptionally well-preserved in its original, 750–900-year-old location.

Table 1. Estimated Unexcavated Areas at Kimball Village.

Researchers	Totals excavated Area (feet²)	Volume (feet³)
Orr (1942)	2,168	15,851
Bryson and Baerreis (1968); Henning ed. (1968/1969)	75	625
Whittaker (2010)	5	35
Total excavated	2,248	16,511
Site size	82,800	579,600*
Total unexcavated	80,552	563,089*

*assumes average deposit depth of 7 ft

Dense layers of cultural materials and features of primary deposition still abound at Kimball Village. It appears that little soil has been lost to erosion in the 70 years between Orr's and the most recent site excavations in 2009. Orr (1942) reported between 7.5 and 8.0 feet of cultural materials and features amidst the soil matrix near the top of the midden; Bryson and Baerreis (1968:13) found 8.0 to 8.5 feet. The recent work verified that 6.5 to 8.5 feet of deposits remained. In addition, a variety of non-invasive techniques have identified at least 20 houses and possibly a surrounding timber palisade remnant, still present at Kimball Village (Kvamme 2009; Whittaker 2010). Cultivation has only impacted the upper 25 cm (10 inches) of deposits. Apart from one pit of unknown size, no known subsurface looting has occurred at 13PM4. Orr (1942:63–64) mentioned that a former owner or tenant at Kimball Village did excavate a "deep pit" somewhere on the site, finding bones, clam shells, pottery and ashes. He continued, stating, "Unlike the Broken Kettle [another nearby Big Sioux phase village], this site [Kimball Village] was apparently unknown to but few beside the successive owners or tenants of the farm."

These archaeological and cultivation alterations are very slight and have not affected the site's ability to convey its significant associations. Historic integrity remains extemely high.

FUTURE USE

For the foreseeable future, farming will continue at the Kimball Village.

INTEGRITY STATEMENT

Kimball Village is in excellent condition. The site exhibits extremely high historic integrity according to all of the National Register's seven qualities: location, setting, materials, workmanship, design, feeling and association. Details are provided in Section 8, "Criterion D and Registration Requirements."

SUMMARY STATEMENT

As the earliest, best preserved eastern Great Plains fortified village known in the United States, Kimball Village is nationally significant for the detailed scientific data it has provided and the in-ground data it still contains (Criterion D) in the areas of Prehistoric Archaeology, Native American Ethnic Heritage, and Community Planning and Development. Kimball Village contains information essential to our understanding of the prehistoric horticultural frontier at the time of the transition from dispersed settlements with a broad-based subsistence economy (the Woodland lifeway) to nucleated village life and the increasing agricultural reliance on domesticates and the North American small seed complex (the Plains Village lifeway), a new way of life that transformed cultures across North America. Kimball Village embodies all of the distinctive characteristics of economy, settlement, community planning, and material culture that typify sites of the Initial variant of the Middle Missouri tradition.

Kimball Village is nominated in association with MPDF *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa* (Alex and Peterson 2010), specifically, the *Big Sioux phase, A.D. 1100–1250* historic context. The site is associated with both of the context's defined property types (villages and mortuary facilities). Historic and depositional integrity of this site is extremely high. Kimball Village meets the registration requirements as set forth in the MPDF.

SITE OCCUPANTS

Kimball Village was occupied by Big Sioux phase peoples, as evidenced by the artifact assemblage, radiocarbon dates, and the distinctive midden mound architecture. Four dates obtained from eight radiocarbon samples from the 1963 excavations were recalibrated by Lensink (2009). The dates securely indicate the site was occupied during the Big Sioux phase, A.D. 1100–1250. Ceramic sherds of Sanford, Chamberlain, and Foreman wares, and the Mill Creek ceramic group found during both the 1939 and 1963 excavations confirm a Big Sioux phase affiliation. Mill Creek and Chamberlain were the most common, comprising more than 75 percent of all wares identified from the Bryson and Baerreis (1968) work.

Four Great Oasis rim sherds have been recovered from the lower excavation levels at 13PM4. In comparison, from these same levels, 183 rims definitively associated with the Big Sioux phase have been found in those same two levels (Henning et al. 1968:88–90). Some researchers suggest that Initial variant villagers traded with Great Oasis peoples or that Great Oasis sherds in the lower reaches of Initial variant sites are the result of the transformation of Great Oasis peoples into those of the Initial variant (E. Henning 1981:34–35; Henning et al. 1968:90; Henning and Henning 1982; Lensink and Tiffany 2005:129). All available evidence demonstrates that components of site 13PM4 are associated with the Big Sioux phase.

SITE COMPARISONS

As noted in Alex and Peterson (2010:17), both Big and Little Sioux phases are linked to eight (Tiffany 2007) other member phases of the Initial variant by a constellation of traits relating to settlement, economy, and technology. Currently, 48 Initial variant sites are recorded in the two discrete localities (Big and Little Sioux localities) in northwestern Iowa. Big Sioux phase sites are currently known from six villages and eight separate mortuary facilities (in addition, three of the villages contain mortuary facilities) dispersed over a 17 x 9 km area (Fishel 1995:69) in the valley of the Big Sioux and three of its tributaries. The other sites are in the Little Sioux locality; of those, 26 are confirmed or suspected villages. Two sites included in a previously defined Perry Creek phase (Henning 1982a, 1982b, 1982c, 1996) are herein placed in the Big Sioux phase as described below and discussed in Alex and Peterson (2010).

The five other known villages included here in the Big Sioux phase are 13PM1, 13PM7, 13PM60, 13PM61, and 13PM429/WD105 (respectively, Broken Kettle, Joy Creek Major, Gytens, Larson, and unnamed). Henning (1982a, 1982b, 1982c,1996) has proposed a Perry Creek phase to encompass sites such as Larson (13PM61) and Gytens (13PM60), which produced assemblages of both Mill Creek and Great Oasis ceramics. The preponderance of a Mill Creek assemblage in the excavations at 13PM61, however, led Henning to declare Larson, and tentatively 13PM60, as single component which "principally reflects the Mill Creek tradition and minimally reflects the Great Oasis tradition" (1996:15), and strongly suggests their affiliation with other IMMT sites in Iowa. For this reason both of these sites are here included within the Big Sioux phase context. Future researchers may consider the question of mixed Mill Creek-Great Oasis sites such as Larson and Gytens, and whether a separate Perry Creek phase historic context need be developed to supplement Alex and Peterson (2010).

Big Sioux phase village acreage ranges from 0.34 to 3.65 hectares (0.84 to 9.01 acres). At least six Little Sioux phase villages were fortified by a palisade and/or ditch. The only Big Sioux phase village with such identified fortifications is Kimball, with its possible ditch and timber palisade (Kvamme 2009). All identified Big Sioux phase lodges are rectangular with rounded corners (Figure 7). Some houses at Little Sioux phase sites were diamond or square-shaped (e.g., Chan-ya-ta, Wittrock; 13BV1, 13OB4), so it is possible that non-rectangular houses were present at Big Sioux phase villages as well. At Little Sioux phase villages, there is evidence that some houses were semi-subterranean, wattle-and-daub-covered houses with a timber superstructure and extended entryways. Chan-ya-ta and possibly Wittrock produced some evidence for superimposed houses. Despite his extensive work at Kimball Village, Orr's investigation (1942) only confirmed the timber superstructure, with evidence of the other common superstructure elements of the Little Sioux phase absent at 13PM4. The absence of an excavated house floor, wattle-and-daub, or extended doorways may be more a function of the 1939-excavation methodology, than of actual differences in house construction methods. Kvamme's (2009) geophysical survey indicates south-facing, extended doorways at 11 of the 20 magnetic gradiometry survey-indicated house features. Kvamme's work suggests the houses were arranged in five rows, with three to six houses per row. At least two sets of houses were

overlapping, indicating successive construction. Wittrock (13OB4), a Little Sioux phase village, also contained at least 20 houses arranged in a similar fashion, with all but three doorways facing south.

Sites 13PM7, 13PM60, and 13PM429/WD105 have been subjected to surface collection only; nothing is known about site integrity or the presence or absence of subsurface features, such as houses or storage pits. Kimball, Broken Kettle, and Larson villages (13PM4, 13PM1, and 13PM61) have received some professional archaeological excavation. At Larson Village, no houses were confirmed during the excavations, although several pit features were present (Henning 1982:29), and Henning suspected the presence of a house (1996:16). Orr's (1942:28–29) work at Broken Kettle Village revealed a square-to-rectangular-shaped post-mold alignment, which he was hesitant to definitively call a house, even though it did contain a central fireplace. The 1969 excavations of three 1.5-x-1.5-m test units at Broken Kettle exposed three house basins, stacked one atop another, in a side wall profile (Henning and Henning 1982:15). No dimension estimates were possible, given that only a very small part of the houses were exposed in the test units. The sheer quantity of avocational and professional excavations at Broken Kettle is nearly overwhelming; apart from the MPDF (Alex and Peterson 2010), which discusses this work in summary form, no detailed synopsis of the variety of work at Broken Kettle exists. One difficulty in summarizing the 13PM1 excavations is the quality of early excavation maps: they are poor or nonexistent. Only the excavations at Kimball Village exposed houses to an extent that their dimensions are measurable, although the size of one lodge at 13PM1 can be roughly extrapolated.

Work at Little Sioux phase villages has been more extensive, with 13 of the 26 confirmed or suspected villages receiving some excavations. Four of these villages are on the National Register of Historic Places: 13BV1 (Chan-ya-ta , listed 1978), 13CK15 (Brewster, listed 1979), 13CK21 (Phipps, listed 1966), and 13OB4 (Wittrock, listed 1966). Phipps and Wittrock villages are National Historic Landmarks (Weiss 1974a, 1974b). Wittrock Village, in O'Brien County, is considered unique due to its relative lack of disturbance since occupation. At least 20 dwellings stood on the site, fortified by a palisade and a ditch. In Cherokee County, Phipps Village formed a dense midden, similar to the midden found at the Big Sioux phase Broken Kettle and Kimball villages and the Little Sioux phase Brewster Site (13CK15). The Phipps Site has strongly influenced modern understanding of midden formation processes. Both the NHL-listed Little Sioux phase sites have significantly contributed to our understanding of the transition to nucleated village life, the origins of the Middle Missouri tradition, changing subsistence patterns, and trade networks. Other Little Sioux phase villages are less well understood. For example, at Skadeland Village (13CK402), limited excavations uncovered four large storage pits, but no house outlines have yet been discovered (Powell et al. 2009; Zimmerman 1971).

All other known Initial variant sites, over 50, are found in South Dakota along both sides of the Missouri River and its tributaries with 3 outlier sites in southern Minnesota. Four of these sites have been designated National Historic Landmarks, and at least eight others have been listed on the National Register of Historic Places, including the villages of Antelope Creek (39ST55), Brandon (39MH1), Breeden (39ST16), Cattle

Oiler (39ST224), Dinehart (39LM33), Jiggs-Thompson (39LM208), King (39LM55), and Sheldon Reese (39HS23). The National Historic Landmark Initial variant village sites are:

- Bloom (39HS1, Lower James phase, IMMT-east)
- Crow Creek (39BF11, Swanson phase, IMMT-west)
- Langdeau (39LM209, Grand Detour phase, IMMT-west)
- Mitchell (39DV2, Lower James phase, IMMT-east)

Bloom, Mitchell, and Sheldon Reese, along with the Twelve Mile Creek site (39HT1), belong to the Lower James phase, which along with the Brandon, Cambria, and Big and Little Sioux phases of Iowa form the eastern Initial variant of the Middle Missouri tradition (IMMT-east). All other Initial variant sites on the Missouri River proper are grouped into five additional phases: Swanson, Grand Detour, Sommers, Cattle Oiler, and Anderson, and form the western IMMT.

All but one (Sheldon Reese) of the South Dakota National Register-listed sites were recorded and initially investigated pre-1969, most as part of salvage archaeology conducted by the Smithsonian Institution River Basin Surveys (RBS) program, and many are minimally reported. Nomination of these sites to the National Register (some incorporated into District nominations) was inspired, in part, by an effort to preserve sites which had survived impoundment of the Missouri River. Most were nominated for their potential to contribute additional scientific information (Criterion D). While many of these National Register-listed sites in South Dakota are largely intact, others (Breeden, Mitchell, Crow Creek, and Dinehart for example) have been impacted by bank erosion, cultivation, and/or irrigation.

The results of the RBS salvage-work at these sites established the basic culture-historical model for the Middle Missouri tradition as outlined by Lehmer (1954, 1971) and defined the fundamental characteristics of the Middle Missouri tradition and the Plains Village pattern. With but a few exceptions (Tiffany 2003a; Toom 2004; Bamforth and Nepstad-Thornberry 2007), Lehmer's model has remained largely unchallenged by Plains researchers in South Dakota. A new taxonomy has been adopted for later sites of the Middle Missouri tradition and those of the Coalescent tradition, based primarily on work in North Dakota (Ahler et al. 2007).

Studies of the South Dakota sites over the last thirty years, mostly from extant site collections, recent surveys (some intensive), mapping, and limited excavation, continue to address ceramic taxonomy and chronology, (e.g., Ahler et al. 2007; Alex 1981a, 1981b; Bamforth and Nepstad-Thornberry 2007; Johnson 2007; Tiffany 2003a; Toom 2004), but also extend to questions of social interaction and cultural process (Kay and Ahler 2007:xvii). The concentration of significant sites on the Missouri River and tributaries such as the James, offers the potential for examining the evolution and adaptation of early horticulturalists to a Plains environment, and the question of environment as a determinant of village location.

In contrast to the eastern IMMT sites, a number of the western sites including Cattle Oiler, Breeden, Jiggs Thompson, and Crow Creek, are multicomponent and contain later Middle Missouri tradition and non-IMMT components. The Crow Creek site is unique in providing evidence for an extraordinary 14th century massacre of perhaps the majority of its residents (Bamforth and Nepstad-Thornberry 2007; Zimmerman and Bradley 1993), lending important information about a period of considerable conflict on the Plains. Recent investigation of radiocarbon dates and ceramic sequences (see Johnson 2007), as well as the presence of Great Oasis ceramics at some sites (Dinehart and Langdeau) and Mississippian-inspired items at others (Mitchell and Twelve Mile Creek), indicate that some South Dakota locations may represent an early period in the Initial variant, and thus could contribute to understanding its origin from local, late Woodland (including Great Oasis) or other Initial variant communities (including Mill Creek). Ceramic differences, especially the high incidence of cord-impressed as opposed to incised rim decoration, have been noted between the IMMT sites of South Dakota and those of Iowa. Later components at sites such as Crow Creek offer the potential for understanding the demise of the IMMT and its relationship to both the Extended Middle Missouri variant and the emerging Coalescent tradition.

Although a few of the IMMT sites in South Dakota, such as Mitchell, have evidence of midden deposits which could help elucidate site formation processes (R. Alex 1973; Baerreis and Alex 1974), most sites are generally not the compact, deep midden-mound villages like Kimball. Their location, typically on high, Late Pleistocene terraces above the floodplain with minimal surface deposition, however, provides an excellent opportunity for mapping well-defined house depressions and ditches using modern geophysical and total station survey methodologies, thus contributing to an understanding of village layout and size. Sites range from three acres to over 45 acres and contain from a few house depressions (Breeden has only 4; Dinehart 5, Jiggs Thompson 17, Brandon 37, and Mitchell 40-45) to over 60. The Sheldon Reese site itself covers twelve acres and contains at least 70 surface depressions. The site is one of the largest and most undisturbed IMMT sites in South Dakota and has had only minimal testing. About half of the South Dakota sites are fortified, most by a ditched spur of land, with precipitous slopes protecting the site on three sides. Some, including Mitchell and Crow Creek, have more complex fortification systems.

Villages appear to be arranged in vague lines of lodges but Brandon, Mitchell, and Langdeau have no apparent order (Ludwickson et al. 1981). All of the sites produced (and still contain) considerable evidence for further refinement of IMMT architecture, economy, material culture, and chronology. Unlike sites of the Big Sioux phase, none of the South Dakota sites except for Mitchell (Alex 1988; Meleen 1938) have provided more than minimal data regarding funerary customs, and no well-defined mortuary locations are known. Information from Big Sioux phase mortuary locations currently represents the best available data on IMMT funerary customs.

PREVIOUS INVESTIGATIONS

Apart from one pit of unknown size, no known subsurface looting has occurred at Kimball Village. Orr (1942:63) mentioned that, "Unlike the Broken Kettle [another nearby Big Sioux phase village, 13PM1], this site [Kimball Village] was apparently unknown to but few beside the successive owners or tenants of the farm." He continues, mentioning that a former owner or tenant did excavate a "deep pit" somewhere on the site, finding bones, clam shells, pottery and ashes (Orr 1942:64). Despite the active field work by the Sioux City Academy of Sciences and Letters and other local citizens, it would appear that these individuals were unaware that a site existed at 13PM4. This group of interested scientists and laypersons collected natural and cultural materials as they related to nearby Sioux City's past. They reported on large trenches excavated into nearby Broken Kettle Village (Powers 1910; Stafford 1906). The absence of similar activity at Kimball Village is a boon to the site; the Academy's work at Broken Kettle is very poorly documented.

Three separate professional investigations have been conducted at Kimball Village. The first excavations took place in 1939, undertaken by Ellison Orr (1942), under the direction of Charles R. Keyes and the Iowa Archaeological Survey. This work involved large-scale shovel-trenching, and the exposure of house, storage, and burial features, along with the gathering of a spectacular artifact collection. In 1963, the University of Wisconsin excavated three small test units (Bryson and Baerreis 1968; Henning, ed. 1968, ed. 1969). These excavations were part of a study assessing the link between climate and culture change at Mill Creek sites. The most recent investigations were conducted in 2009 by the Iowa Office of the State Archaeologist (OSA) and the University of Arkansas-Fayetteville and are directly associated with efforts to assess site integrity for this NRHP nomination (Kvamme 2009; Whittaker 2010).

1939: Ellison Orr and Works Progress Administration (WPA) workers: Trench Excavations uncover House Features

In 1936, Iowa archaeologist Dr. Charles R. Keyes first heard that artifact collectors were finding materials at a site that later became known as Kimball Village (Figures 8 to 13). He could not have foreseen the spectacular finds that would await his assistant, Ellison Orr, when Orr and 14 WPA workers shoveled trenches into the 8-foot-thick cultural deposits three years later, exposing entire prehistoric houses, hearths, storage pits, and burial features. The range of artifacts, more than 9,000 in all, was astonishing: fishhooks carved from bone; over 100 other tools made from bone, including awls, squash knives, chisels, scoops, and matting needles; complete pottery vessels; ceramic pottery handles fashioned into the shapes of animals; tools made from stone, like hide scrapers, drills, knives, arrow points, whetstones, and abraders; smoking pipes, carved from pipestone; and many articles of personal adornment, like bone, stone, and shell beads, bone pins, perforated animal teeth, also used as beads, an earspool, and mussel shells, delicately carved into fish shapes or into pendants.

Keyes learned about the site from W. C. French, a Civilian Conservation Corps (CCC) camp officer who was fascinated by archaeology. French (1936a) reported in a letter that artifacts were present at ground surface on the terrace of the Kimball family property:

> Did you know there was a mound similar to the Broken Kettle Mound, about 3 ½ or 4 miles southwest of that mound, near the Big Sioux River, & near the Sioux River Road. This mound is I believe bigger in circumference, & as high. The pottery fragments run more to greys or dirty white, while, there are some reds & yellows. My most interesting find was a small handle of a bowl shaped as a human head. Also found a broken piece with a perforated tip. Showing that either woven grass or a rawhide thong was used as a bale.

Two weeks later, French (1936b) wrote again about Kimball, with excerpts below:

> You were right, the mound is south & not south west of the Broken Kettle Mound. In walking, I Knew I went east to #12 & then east of #12 to Mr Mosher's Farm, but forgot that the highway ran to the northwest. From the map of Plymouth Co. I gather that the mound is in [redacted] I was given permission to look over the mound on weekends by a Mr. Kimball...I tried to pick specimens from the mound- as large as possible, & those of color, grey, yellow, & red, & thin & thick pieces, I'll try & secure some better rim pieces after plowing & a good rain. Mussel shells, bone & rock in large quantities cover the mound, have found some flint pieces, & chips of obsidian, also a small polishing stone. Have a handle of pot representing a leaf. It is of yellowish color...Also found what is probably a bead made of shell. I am quite enthused over this mound as it is within easy walking distance of the camp. I hope those specimens will be of interest to you...

The next letter from French (1936c) was written four months later, in September 1936. He included a box of sherds from the site. In June, 1937, French (1937a) reported on his recent findings at the location he now referred to as "Kimball Mound:"

> Because of our wet Spring & early Summer, I have made several trips to the mound usually finding a few arrowheads, some perfect, others more or less broken, a few beads, many "thumb" scrapers, & awls of flint or chert. Last Saturday, I found 3 perfect arrowheads, many scrapers, a piece of broken highly polished stone disc (?), & the most interesting thing of all, a small replica of shell of the thunder bird. (This I consider my most important find.) It was heavily incrusted, as are many of the shells found there.

Keyes (1939b; Table 2) made an inventory of French's Kimball Mound collection in October, 1939. Comparisons between the Keyes collection from the site now in the OSA repository and the French collection inventory suggest French did not donate these items to Keyes. The modern location of these items is not known.

Since 1934, Charles R. Keyes had coordinated excavations conducted by Ellison Orr as part of Works Progress Administration projects under Project 1047 of the Iowa Planning Board. Orr would eventually excavate three Mill Creek culture sites under the auspices of a similar endeavor, Project 3600: Broken Kettle and Kimball villages of the Big Sioux phase and the Little Sioux phase Phipps village site (Keyes 1935a; 1935b, 1940; Orr 1942, 1963). Keyes must have asked French about obtaining permission to excavate the site, as later that summer, French (1937b; excerpted) says:

Table 2. Charles R. Keyes' Artifact Inventory of the W. C. French Collection from Kimball Village.

Spec. No.	Artifact Description
2	pottery effigy human heads, one with head dress, other with broken space at back possibly indicating one
3	bird effigy heads
1	buffalo (?) effigy handle
1	bear (?) effigy lug
1	bear head effigy lug
1	sleeping dog or bear effigy lug
2	owl (?) effigy lugs
1	marine shell eagle (?), head turned to left
ca. 50	disc and short tubular shell beads, some of which at least, are from marine shells
1	columella of marine shell
1	olive shell
1	very small conch shell (2 larger ones lost)
1	"door knob" (reddish gray granite, 1⅞", slightly more convex on one side)
1	broken piece of worked hematite

> I hope you will pardon the fact that I have not written befor [*sic*] to other causes than neglect. I have not been able to contact Mr John Kimball in regard to excavating the mound, but expect to be able to soon. He lives in a little house about ½ mile north of the mound. I have met his two brothers in law & several neighbors. From what I hear perhaps a written statement of permission would be better than a verbal one. If I can stick around him long enough, perhaps I can gain his consent. All the places I have spoken of are in corn, & because of that a month or 6 weeks must pass befor [*sic*] one could get into these fields. Do you have written or printed contracts which you sign in regards to what you do in a field & also the condition in which the field is left after the excavation? Mr Briggs told me to get a contract & let him look it over. He was on the Marks property when the Broken Kettle Mound was first opened. Very little has been found on or near the Kimball Mound recently...

Keyes' (1937) notes from the following month mention the owner (Kimball) and the tenant (L. E. Brown). He describes it as a "Mill Creek village site on terrace of Big Sioux river, 2½–3 miles N. of Stone Park." In October, French (1937c) described recent finds from Kimball Mound: "3 very fine flint awls, 6 small arrowheads, & one very interesting pot handle. As to whether an attempt was made to feature some bird I can't say, but such appears to be the case. I have a small human head & a leaf pot handles."

Keyes (1939a) visited the site in June, 1938, and met the landowner, Eleanor B. Kimball. That October, French (1938a) reported that little of interest had recently been found at Kimball. In May, 1939, Keyes (1939a; Orr 1942:64) asked Mrs. Kimball if Ellison Orr could excavate at the "old Indian village site" in her farm field. She granted permission and was compensated $20.00. Orr (1939a, 1942:63) reported that he and 14 WPA workers began work at Kimball mound August 28, 1939. Keyes visited the site sometime between August 28 and September 23 (Orr 1939b). The first order of business was to survey and map the site.

Orr provided field update letters to Keyes every three to ten days. Orr reported on artifacts found and features identified (Orr 1939b-e). Most of the excavation information appears in his final report on the site (Orr 1942, 1963), but some new information does emerge from the correspondence. In his first report, Orr (1939b) noted artifacts were few in the upper 18–24 inches of excavations. The underlying 4-foot-thick soil "unit" was described as follows:

> grayish earth contained much small [illegible] particles and [illegible] bits of charcoal, ash lenses and thin irregular traces of ashes accompanied by considerable charcoal, broken bones-not so many except in not more than half a dozen not large accumulations, disseminated pottery sherds, occasionally large sherds in nests, bone implements, etc [Orr 1939b].

Below this unit was the "good stuff," which contained obvious post-mold alignments and pit features extending down into the subsoil at the bottom of the site. This horizon was described as follows:

> The lower 2 ft. to the gumbo contained but little charcoal, fewer ash beds, an occasional large sherd with fewer scattering small sherds, and occasional good implements. The grayish earth into which the 18 in. of top granulated soil continued, with a rare thin streak of yellow, down to the gumbo, the line of separation between it and the gumbo being very short and distinct [Orr 1939b].

Orr's crew first excavated Trench A east-west across the southern one-third of the site (Figure 10). The trench was divided into excavation units, called sections. Trench A consisted of 22 sections, totaling 152-feet in length. The sections of Trench A typically measured 5 x 7 feet, but several were expanded into larger units. When post-mold alignments were discovered, 18 additional sections of varying size were excavated out from Trench A, to follow the house outlines. Trench B was placed parallel to the first trench. Orr's (1942:64) text states that Trench B was five feet north of Trench A, but his map and later text (Orr 1942:90) and a modern geophysical survey (Kvamme 2009) suggests it was actually 50 feet north. Trench B contained seven units, all measuring 5 x 7 feet. Nine test pits or "T.P.'s" were excavated at outlying parts of the site. These units were variable in size, with most measuring 5 x 5 feet. All told, Orr (1942:74) calculated the excavations covered a surface area of 1,966 square feet, with 593 cubic yards (455 m^3 or 16,066 $feet^3$) excavated. Modern recalculations using his trench dimensions suggest the excavations may have covered an area as large as 201 m^2 (2,168 $feet^2$) with an excavated volume of approximately 449 m^3 (15,851 $feet^3$). In most instances, the WPA crew excavated in 1-foot (30-cm) increments.

Orr (1939b, 1939c) made every effort to identify the corners and floors of houses at Kimball Village (Figures 5 and 11). The house floors were built "directly on the gumbo [subsoil], 8 ft below the present surface" (Orr 1939c). He noted that, in some cases, the posts contained small amounts of decayed wood. Orr (1939d) speculated that there was room for as many as 20 houses at the site, if there was no central plaza. Interestingly, exactly 70 years later, geophysical work suggested just that many houses were in evidence (Kvamme 2009). The WPA excavations at Kimball ended around November 5, 1939 (Orr 1939f). They had lasted two-and-a-half months.

A final report on the Kimball excavations was issued in 1942, and was combined with the Broken Kettle (13PM1) findings (Orr 1942). Orr noted both sites were built on flat terraces, built up by years of habitation. At Broken Kettle a post-mold alignment was present, although Orr was reluctant to call it a house. Postmold alignments at Kimball Village signified three and possibly four houses. At both sites, posts were generally spaced 6–12 inches apart, enclosing rectangular areas. The post molds usually extended 8–16 inches deep, with vertical sides, and were 4–5 inches in diameter. One house at Kimball may have had a central support post, 10-inch diameter. Orr identified no daub or charred timbers at Kimball.

The three houses at Kimball Village were spaced 12-feet apart in a row with the "north sides, toward the mound center, approximately in a straight line" (Orr 1942:39; Table 3; Figure 5). Orr noted a difference between these houses and those of the Glenwood culture (Nebraska phase of the Central Plains tradition). In Glenwood, houses were semi-subterranean, with their floors excavated into the ground. Along the Big Sioux River, floors were level with the surrounding ground.

Table 3. Big Sioux Phase House Information (compiled from Orr 1942).

Site	House	ft	m	ft^2	m^2	Associated features
13PM1	A	20x30	6.1x9.1	600	55.5	central fire pit; ash deposit
13PM4	A	20x25	6.1x7.6	500	46.4	none identified; 52 associated post molds
	B	20x28	6.1x8.5	560	51.9	central fire pit; 81 associated post molds
	C	18x29	5.5x8.8	522	48.4	central fire pit; one or two interior support posts; four interior storage pits; one interior burial pit; one exterior storage pit, bark-lined; 126 associated post molds

Orr presumed the three Kimball Village lodges were contemporaneous to each other, based on the presence of post molds extending into the subsoil to similar depths and because the post molds from the separate houses were encountered at the same upper levels of elevation. Houses were spaced 3.6-m (12 feet) apart, with the north sides aligned in a row. At Houses A-C, 30, 33, and 82 percent of those interiors were excavated.

Orr (1942:67–68) noted several pits at Kimball Village were "all filled with yellow clay" and artifacts. Pit dimensions ranged from 0.37–0.61 cm (1.2–2 feet) in depth and were ovate or circular in plan. Widths ranged from 45–91 cm (1.5–3 feet). One pit was bell-shaped; the others were deep basins.

Generally, Orr did not discuss soils in areas lacking substantial features. He did note that there were "lens-shaped deposits of pure white ashes found throughout mound, occasionally surrounded by red burned earth" (Orr 1942:40). These occurred at a variety of depths, from between 1.2 and 2.3 m (4 and 7.5 feet) below ground surface. Often, Orr mentions the "gumbo" at the site. This term refers to the natural, culturally sterile soil horizon that lay below the village deposits.

Orr (1942:41) noted the presence of human remains in the village, also acknowledging that "ossuaries containing bundled (often times many) skeletons have been found on surrounding bluff tops." These include sites 13PM23 and 13PM248, both of which could be seen in the Loess Hills above Kimball Village. Orr mentioned four burial locations at the village, and that the farm tenant had previously found four others. The four 1939-excavated burial locations were (paraphrased from Orr 1942:66, 87):

- A burial of five skeletons, partially bundled (10 feet from Trench A in Sec. 27, 6 feet below surface; about 6 feet south of the southwest corner of House A) covering an area of roughly 3 square feet
- In excavation Section 38, 3.5 feet below surface, was the skull of a child, some badly decayed bones, and two femora; below this, 4.7 feet below surface, another skull and badly decayed bone fragments (within House C)
- T.P. #9 – Decayed lower jaw of an old person at .8 ft. above the gumbo (not associated with a known house; on the far southwest corner of the site)
- Sec. 40 – pieces of skull 2.4 feet below surface (horizontally within House B, but house remains not definitively defined until much deeper in the excavations)

Modern review of the excavation materials reveals that Orr did not return all of these remains to Keyes, possibly leaving the more fragmentary elements in the field. For instance, Orr (1942:87) sketched the five-person burial, clearly depicting five crania. Modern analysis suggests the five-person-burial contained the bundled, partial remains of at least four persons: an older infant, a teenaged female, a male in his twenties, and a possible young adult male. It is possible these remains represent interment after a scaffold burial. Orr mentions the bundled remains of two children within a burial pit in a house, but modern analysis suggests the remains of only one individual, aged 5.5–6.5, was present or returned to the laboratory (Schermer et al. 1998). There were also instances where WPA excavators encountered isolated human remains which were not recognized as such until they were brought into the laboratory. At 13PM4, isolated fragments from four individuals were not recognized as human in the field, but were later identified in the laboratory (Schermer et al. 1998:69).

After excavation was completed, Keyes and/or Orr catalogued the artifacts. Keyes sent some materials out for expert analysis. Some of these results were included in Orr's (1942, 1963) final report. Volney Jones (1940) from the University of Michigan identified plant materials from Broken Kettle and Kimball villages. He reported the condition of preservation from both sites was "not favorable." From Broken Kettle, he identified bark, but did not identify the species. From the Kimball Village sample (Section 13 of Trench A, 6-feet below ground surface or 2-feet above the trench floor, in House B), Jones identified "short pieces of carbonized grass...some of the grass is matted together." It is not clear if he meant this was simply a clump of material or represented an actual mat fragment. No other identifications were offered for Kimball Village botanical remains. Mussel shells from the excavations were identified by T. C. Stephens (1941, 1943). There were about 25 shells too badly broken to identify, and five others he could not identify. Stephens was able to identify 13 different mussel species. One page of his report is missing, so three of his identifications are not known.

Table 4. Fugle's (1957) Recatalog of the Selected Artifact Classes from the 1939-Excavated Kimball Village Collection.

	Depth below surface, in feet								
	Surface	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	Totals
CHIPPED STONE TOOLS										
UNIFACED										
Side-Scrapers	0	0	2	5	1	5	0	5	1	19
End-Scrapers	0	0	3	3	2	6	0	2	0	16
BIFACED										
Knives	0	0	1	2	0	4	5	1	0	13
Projectile Points	0	0	0	0	2	1	1	0	1	5
Drills, Perforators, Engraving Tools, and Reamers	2	0	3	1	3	3	0	0	0	12
PECKED OR GROUND STONE TOOLS										
Mullers	0	0	1	1	0	0	0	0	0	2
Whetstones	0	0	0	1	1	0	1	0	1	4
Pigment grinding tablets	0	0	0	2	0	2	0	0	0	4
Deep-grooved sandstone abraders	0	0	0	5	2	0	1	0	0	8
Chunkey stones	0	0	0	1	1	0	0	1	0	3
Hammerstones	0	0	0	1	0	0	1	0	0	2
Celts	0	0	5	6	3	1	2	2	1	20
Pumice and scoria abraders and sharpening stones	0	1	2	2	3	3	6	0	0	17
Catlinite rubbing stones	0	0	0	1	1	2	0	0	0	4
Earspool	0	0	0	0	0	1	0	0	0	1
Arrowshaft smoothers	0	0	0	1	2	0	0	1	0	4
Catlinite tubular pipe	0	0	1	0	0	0	0	0	0	1
Catlinite pipe bowl fragment	0	0	1	0	0	0	0	0	0	1
BONE, ANTLER, HORN, and SHELL										
Awls	0	1	7	16	22	11	10	11	4	82
Perforated deer phalanges	0	1	3	2	0	2	5	1	0	14
Perforated bison phalanges	0	0	1	1	0	0	0	0	0	2
Bison horn scoops	0	0	0	0	0	2	0	0	0	2
Fishhooks	0	0	0	3	1	0	0	1	1	6
Fishhook blanks	0	1	0	1	2	0	1	1	0	6
Perforated canine tooth pendants	0	0	1	0	1	1	0	0	0	3
Squash knives	0	0	0	0	1	0	1	2	1	5
Antler beads	0	0	0	0	0	0	0	1	0	1
Bone disc bead	0	0	0	0	1	0	0	0	0	1
"Bangles"	0	0	0	0	0	0	0	2	0	2
Scapula hoe	0	0	0	0	1	0	0	0	0	1
Antler cylinders	0	0	0	1	0	2	0	0	0	3
Bison metatarsal flesher, unserrated	0	0	0	0	0	0	0	1	0	1
Bone-chisel	0	0	0	0	0	1	0	0	0	1
Bison horn scoops	0	0	0	0	0	3	0	0	0	3

Table 4. Continued.

	Depth below surface, in feet								
	Surface	0–1	1–2	2–3	3–4	4–5	5–6	6–7	7–8	Totals
"Snow-snakes"	0	0	1	1	0	0	0	0	0	2
Spearhead shaped pendant	0	0	0	0	0	1	0	0	0	1
Fish spine bead	0	0	0	0	0	0	0	1	0	1
Bone armlet	0	0	0	0	0	0	1	0	0	1
Long bone tubes	0	0	1	0	0	0	0	1	0	2
Short bone tube	0	0	0	0	0	0	1	0	0	1
Bone pins	0	0	0	1	3	0	0	0	0	4
Bone pin with carved head	0	0	0	0	1	0	0	0	0	1
Spheroid or cancellous bone	0	0	1	0	0	0	0	0	0	1
Gorge	0	0	0	0	1	0	0	0	0	1
Spatulate bone objects	0	0	1	4	3	3	4	0	1	16
Olivella shell beads	0	0	0	0	2	0	2	1	0	5
Snail shell beads	0	0	0	0	0	0	0	1	0	1
Unperforated shell discs	0	0	0	0	0	1	2	0	0	3
Shell thunderbird effigy	0	0	1	0	0	0	0	0	0	1
Shell fish effigy	0	0	0	0	1	0	0	0	0	1
Shell imitation canine tooth	0	0	0	0	1	0	0	0	0	1
Triangular shell pendants	0	0	0	0	2	0	0	0	0	2
Large shell gorget fragment	0	0	0	0	0	1	0	0	0	1
Matting needle	0	0	0	1	0	0	0	0	0	1
Chipping tools or flakers	0	0	8	9	12	4	7	6	1	47

Keyes' (1944) notes mention Kimball one last time in May, 1944, when he again visited the Broken Kettle and Kimball villages, this time with A. F. Allen, editor of the *Sioux City Journal*. Keyes makes no mention of further findings at the site.

Artifacts and findings from the 1939 work at Kimball Village were incorporated into graduate studies (Fugle 1957; Ives 1956). For instance, in an effort to characterize the Mill Creek culture, Fugle (1957, 1962) utilized the Kimball collection (Figure 8). He summarized artifacts from the site (Table 4; note that ceramics are omitted; these were analyzed by Ives 1962). Not only is the artifact catalog valuable toward understanding what types of artifacts were found, but the vertical artifact distribution indicates cultural materials could be found from throughout the village's entire depth.

Fugle characterized the Mill Creek culture on the basis of items made of stone, bone, and shell. Ives (1962) utilized Orr's ceramic collection from Kimball (Figure 9) and Broken Kettle villages, along with 1955 collections from the Little Sioux phase Phipps site to establish essential descriptions of Mill Creek pottery. He noted some significant differences in the pottery, which led him to propose a reclassification of the Little and Big Sioux foci as phases. Ives (1962) characterized the Mill Creek ceramics by ware and vessel type, and his classification scheme was also used by the next researcher to study the Kimball Village

ceramics, Dale Henning (1969:192). Ives mentioned that seed jars decreased in quantity in the upper levels of the midden; a similar finding was noted in 1969. Henning found that Mill Creek ware increased in quantity at Kimball Village from bottom to top of the midden and that seed jars peak in frequency around the middle depths of the midden. He noted that this form may be the "earliest evidence for contact with the Cahokia area by Mill Creek peoples" (Henning 1969:273); Griffin (1946, 1949) had noted a relationship between Mill Creek and Cahokia previously. The World Heritage Cahokia site is located about 500 river miles away, near modern-day St. Louis, Missouri.

Numerous researchers used the 1939 artifact and excavation data to formulate new theories about Initial variant peoples. This collection of 9,014 objects, held in the OSA repository, is of enormous research value, providing comparative Big Sioux phase artifact data to Plains researchers across the country (cf., Anderson 1985, 1987; Fugle 1962; Ives 1962; Johnson 2007; Peterson 1967; Ruppé 1955, 1959a, 1959b).

1963: University of Wisconsin Studies the Relationship between Culture and Climate

The 1939 Keyes-Orr excavations exposed the diversity of the artifact assemblage, and the wealth of preserved features, and led to innovations in the study of the Mill Creek culture. Their goals had been to gain a better understanding of prehistoric cultures in Iowa, while keeping Depression-era workers employed. The next excavations were small in excavation area, covering 75 ft^2, compared to Orr's 2,168 ft^2, but perhaps the goals were loftier: examining a range of Mill Creek culture sites in an effort to understand the link between culture change and climate shifts. The presence of thick midden deposits, like those at Kimball Village, meant that researchers could study cultural change over what was presumed to be a long period of time, a time when climate over the midcontinent was moving from what was viewed as excellent crop-growing conditions to drier, cooler, less hospitable weather.

Walter Klippel supervised the 1963 excavations at Kimball Village, which were directed by Dale Henning. Three 5-x-5 foot (1.52-x-1.52 m) test units were excavated in 6-inch (15.25-cm) levels (Figure 10). General levels were not screened, but features were screened through ¼-inch wire mesh. Pollen samples were taken from unit profiles and features (Henning et al. 1968:82). A fourth, non-cultural square was excavated 50-feet south of the site, to document a natural soil profile.

Squares 1 and 2 were excavated at the peak of the southern mound crest, and were excavated to 9 feet (2.74 m) below surface. Sterile soils were reached at between 96 and 102 inches (244–259 cm) below the surface at the top of the mound. Square 3 was excavated 30 feet southwest on the mound slope, 20-24 inches (51–61 cm) lower in elevation; it was excavated to 84 inches (213 cm; Henning et al. 1968:81). Square 3 encountered Orr's "gumbo" soil at a depth of 76 inches (193 cm; Bryson and Baerreis 1968:13). Within the site boundaries, excavations covered an area of 7 m^2 (75 $feet^2$), or a volume of 18 m^3 (625 $feet^3$).

Four features were excavated. Feature 1 was a concentration of bison bone 183–193 cm (72–76 inches) below surface in Square 2. Feature 2 was a bell-shaped storage pit containing bone, charcoal, and pottery. It was positioned almost directly below Feature 1, extending 213–249 cm (84–98 inches) below surface. At its widest, Feature 2 was 145 cm (57 inches) in diameter. Feature 3 was another bell-shaped pit which extended from at least 234–302 cm (92–119 inches) below surface. The width of Feature 3 was 102 cm (40 inches), and it contained bone, fish scales, charred corn, ceramics, and stone tools. Feature 4 was a third bell-shaped pit that extended to 205 cm (80.5 inches) below surface in Square 3; its top depth was not specified. This feature was full of artifacts, including much charred corn kernels and cobs, burned grass, ash, charcoal, broken ceramic vessels, bone, fish bone, and mussel shell (Henning et al. 1968:82–84; Peterson 1969).

A burial was identified along the north end of bell-shaped pit Feature 4, approximately 51 cm (20 inches) below surface. Probably, the burial pit was excavated accidentally into the edge of an existing, abandoned storage pit. A male, 25–32 years old had been interred in a flexed position. All the teeth present had abscesses at the roots, and the spinal evidence suggested spondylolisthesis, exhibited as the 5th lumbar vertebra displaced over the sacrum. Limestone slabs were found in association with the remains and probable grave goods included an ash-filled pipe, bison scapula hoe, bone chisel or wedge, a bison radius tool, and a possible fish gorge (a type of fishing lure that is a spindle-shaped bone fragment which lodges crossways in a fish when swallowed; Baerreis 1968:142–143; Henning et al. 1968:83; Peterson 1969). No other human remains were identified.

Numerous Late Prehistoric ceramics, all diagnostic of the Initial variant in Iowa, were recovered at Kimball Village, including sherds of Sanford, Chamberlain, and Foreman wares, and the Mill Creek ceramic group. Mill Creek and Chamberlain were the most common, comprising more than 75 percent of all wares. There was no obvious seriation trend in ceramic style ratios with depth (Henning 1969; Henning et al. 1968:84–85). Four Great Oasis rim sherds were recovered from the lower excavation levels at 13PM4.

Considering that the 1963 ceramic assemblage was acquired from the excavation of three 5-x-5-foot squares, the ceramic sherd count was astonishing in quantity: 13,602 body sherds, 740 rims, and 20 "other" (Henning 1969:241). Eleven pottery disks were found, five of which had a central drilled hole. The disks ranged from 16–50 mm (0.6–2.0 inches) in diameter and were all fashioned from plain body sherds (Henning 1969:262).

Bryson and Baerreis (1968:17–18) reported that no oak species were identified from the wood, although oak is now common in the area. Oak pollen was present. Henning et al. (1968:38–39) identified bottomland woods from Kimball: ash (*Fraxinus* sp.), cottonwood (*Populus deltoides*), elm (*Ulmus* sp.), ironwood (*Ostrya virginiana*), maple (*Acer* sp.), and willow (*Salix* sp). Pollen analysis further indicated bald cypress (Cf. *Taxodium),* basswood (*Tilia* Cf. *americana*), juniper (*Juniperus* sp.), and pine (*Pinus* sp.) pollen in very low percentages, with the pine and cypress considered exotics (James and Nichols 1969:308–309).

Identified non-arboreal pollen included maize (*Zea mays*), fireweed (*Epilobium angustifolium*), goosefoot (*Chenopodium* sp.), grass (Gramineae), and sedge (Cyperaceae). The pollen analysis notes that corn cobs were recovered from all levels of the Kimball Village excavations, although this point was not made elsewhere in the report (James and Nichols 1969:315).

The three test units yielded 10,675 faunal elements. Only the megafauna—bison (n = 229 specimens; *Bison bison*), deer (n = 572; *Odocoileus virginianus*), and elk (n = 13; *Cervus canadensis*)—were subjected to detailed faunal analysis. Deer predominated at Kimball, comprising 61 to 77 percent of each of the five analyzed horizons. Bison was second, with 21 to 37 percent, followed by elk with 1 to 2 percent of the total (Bryson and Baerreis 1968:20–23; Frankforter 1969). Other tentative faunal identifications included fish (n = 4,785), bird (n =1,836), rodent (n = 170), carnivore (n = 114), turtle (n = 43), and rabbit (n =34), with the remainder not identified.

Other artifacts of interest include items fashioned from bone or antler, such as fishhooks, awls, flaking tools, scapula hoes and other digging tools, quill flatteners, a perforated dog or bear canine tooth, perforated deer phalanges, worked deer mandibles, a beamer, a chisel or wedge, beads, and numerous other bone tool fragments that defied naming; flaking debris, worked flakes, retouched flakes, projectile points, end and side scrapers, bifaces/knives, drills, abraders, a celt, a groundstone discoidal, hammerstones; shell beads and several pendants; and various pigments. The pigments were classified as limonite (yellow), hematite (red), and "chalk" (white). Kimball Village had more red pigment by far than any of the other 1963-investigated Big Sioux phase sites (Baerreis 1968; Henning et al. 1968:90–92, 187–188).

Chert sourcing involves the identification of the raw material used to make chipped stone tools. Chert identification results in great insight into prehistoric travel and trade networks; chert could be imported from hundreds of miles away. Adequate chert sourcing has never been conducted for the 1939 or 1963 Kimball Village assemblages, although the artifacts are still available in repositories. Baerreis (1968:152–154) noted the following chert or stone categories were present in various quantities within the combined Kimball and Little Sioux collections: cherts that are white chert, tan, brown chert, pink-to-light-red-brown, black, grey-brown, grey, dark grey, and two categories of mottled grey; brown chalcedony (a.k.a., Knife River Flint), other chalcedony; Tongue River "orthoquartzite," red quartzite, other quartzite; yellow jasper; and white quartz. Many chipped stone tools were not categorized by material.

The University of Wisconsin research at Kimball and the Little Sioux phase sites trained and inspired an entire generation of Midwestern archaeologists who over the next two decades produced theses and dissertations on Mill Creek and the Middle Missouri tradition, wrestling with such diverse issues as ceramic classification (Alex 1981a; Anderson 1972); economy and environment (L. Alex 1973; Benn 1974; Dallman 1977; Scott 1972; Wegner 1975; Zalucha 1982), community patterns and social organization (Tiffany 1978; Zimmerman 1971), and taxonomy and chronology (Peterson 1967; Vis 1968; Vis and Henning 1969).

2009: Iowa Office of the State Archaeologist Auger Testing to Verify Integrity and University of Arkansas-Fayetteville Geophysical Survey

The most recent work at Kimball Village had a simple goal: to ascertain if this important site retained the high degree of depositional integrity reported by the 1939 and 1963 researchers. Orr reported between 7.5 and 8.0 feet of cultural materials and features amidst the soil matrix near the top of the midden (Figure 12); Bryson and Baerreis found 8.0 to 8.5 feet. The recent work verified that 6.5 to 8.5 feet of deposits remained. In addition, a variety of non-invasive techniques were used to identify that at least 20 houses were once present at Kimball Village. Integrity remains extremely high at 13PM4.

Kvamme (2009) conducted geophysical surveys at the Kimball Village in March 2009 (Figure 6). Geophysical surveys are methods of understanding archaeological sites without actually digging. Geophysical instruments detect buried features when the properties of a feature contrast with that of the surrounding soil. A variety of instruments and techniques were used, with magnetometry yielding the most informative data. The entire village area of 0.8 ha, plus the surrounding, non-cultural edges were surveyed and mapped, encompassing a total survey area of .96 ha. Within the site boundaries, a host of anomalies were revealed that convincingly demonstrate the presence of intact cultural features beneath the surface, many more than were previously known (Figure 6). These anomalies arise from and represent a combination of prehistoric houses, hearths, pit features, burned areas, and perhaps midden deposits. Preliminary interpretation of the results indicates at least 20 house features within the site (including the three found by Orr), spaced in even rows. Numerous small anomalies around the site perimeter may be former palisade posts. The geophysical survey relocated the excavation trenches made by Orr in 1939. Another, shorter area of possible disturbance appeared in the southeast corner of the site, perhaps signifying the "deep pit" excavated by the owner or tenant sometime before Orr's (1942:64) excavations.

At the same time Kvamme was in the field, William Whittaker (2010) of the OSA excavated thirteen 20-cm-diameter auger tests across the site in an effort to understand the depth of cultural deposits (Figure 10). They compared their findings with those reported by the two previous investigations. In 1939, excavations at 13PM4 revealed the "midden mound" had been built up by Initial variant people a minimum of 2.3–2.4 m (7.5–8.0 feet) above the natural ground surface. More than two decades after Orr's excavations, Bryson and Baerreis (1968:13) reported a 2.4–2.6-m (8.0–8.5-ft)-thick midden deposit remained near the top of the 13PM4 midden, and 1.9 m (6.3 ft) at a location closer to the edge of the midden. Whittaker (2010) found that the site contained a 2.0–2.6-m (6.5–8.5-ft)-thick midden deposit. Very little soil had been lost due to erosion or cultivation. The site remains an extraordinarily well preserved village, occupied sometime between 750 and 900 years ago.

IMPORTANCE OF KIMBALL VILLAGE FINDINGS

Reynold Ruppé (1955, 1959a, 1959b) excavated several Little Sioux phase villages in the 1950s. It was his suggestion that changes detected in the cultural stratigraphy at midden mound villages like Phipps or Kimball might have an environmental cause that presaged the University of Wisconsin studies of the next decade. Archaeologists had been aware that changes in Late Prehistoric cultures appeared to coincide with climatic changes at the end of the Neo-Atlantic climatic episode around A.D. 1250, but the nature of the link between the two was not understood. Scientists argued there was too much theorizing and too little hard data (cf., Fairbridge 1961; Griffin 1961). Led by David Baerreis and Reid Bryson, the University of Wisconsin-Madison initiated the Mill Creek Project to test various methods that might be used to study the culture-climate link (Bryson and Baerreis 1968).

Researchers believed favorable weather during the Neo-Atlantic episode aided or stimulated the expansion of agriculture on the Central Plains. The end of this episode was marked by less rainfall and cooler conditions on the midcontinent. Cultural movements were expected to coincide with this drought period. Radiocarbon dating aided in demonstrating that such a movement in Texas and Oklahoma occurred during the shift from the Neo-Atlantic to the cooler and drier, succeeding, Pacific episode. The Mill Creek culture in Iowa seemed to span a period that included the rather abrupt end of the Neo-Atlantic climatic episode. Because of the known, deep middens at several Initial variant villages which were believed to reflect long periods of occupation, these locales were deemed excellent sites to examine changes in the culture of one group of people over the long duration that included this climatic shift. The University of Wisconsin work at one Big Sioux phase (Kimball Village) and four Little Sioux phase (Phipps, 13CK21; Waterman, 13OB; Waterman Siding, 13OB3; Wittrock, 13OB4) sites in Iowa sought to determine if a similar movement occurred in Iowa at the A.D. 1250 climate shift.

The material culture and simultaneous excavations from several Mill Creek sites, including Kimball Village, during 1963 led researchers to form a number of hypotheses about cultural changes that occurred due to climate change. The suite of radiocarbon dates obtained during the University of Wisconsin investigations suggested that Kimball Village spanned a 300 year occupation, from roughly A.D. 1100–1400 (Bryson and Baerreis 1968:14), although later research would shorten that range, suggesting rather that Kimball Village was occupied for an unknown length of time during the A.D. 1100–1250 period (Lensink 1992, 2003a, 2003b). Overall, radiocarbon dates from the five investigated sites showed that the Initial variant occupation of northwest Iowa was initiated during the Neo-Atlantic and continued into the subsequent Pacific episode. Confirmation that the sites spanned both the good-crop-growing weather and the later, drier and cooler period had significant implications in the study of how humans respond to long-term weather shifts. Lee and Wilson (1969) used the freshwater mussel shell data obtained from Kimball and Phipps to ascertain that the alkaline earth composition of the shells (especially the strontium to calcium ratio) should be an excellent way to study prehistoric stream discharge conditions. Midden sites with clams were the perfect locale to study this topic. They found that significant changes in shell composition over the

occupations of the two sites were related to climate change, specifically, wet and dry periods. Now the question was, how did the Initial variant people adjust to changing climate, and, did they modify resources around them to suit the new weather patterns?

Responses and adaptations to shifting weather conditions are reflected in changing economic practices and settlement patterns, and their associated material culture. Changing proportions of certain faunal remains, especially bison, seemed to reflect the culture-climate link, with the herd moving in accordance with shifting weather, and hunters following them (Bryson and Baerreis 1968:22, 28). In nearly every case, the University of Wisconsin researchers noted that the limited 1963-excavation area, especially at Kimball Village, permitted only a rough assessment of the culture-climate trends. Although exact Mill Creek responses to shifting weather patterns were not completely explained, the study laid the groundwork for future Initial variant research in Iowa and elsewhere.

Not only did work at Kimball Village have implications for the culture-climate link, but excavations from the site aided in understanding a suite of Initial variant, and wider, Late Prehistoric, research questions. The exact origin of the Initial variant (and thus, the entire Middle Missouri tradition) is far from understood, even today, but information from the lower levels of deep midden deposits at Kimball and Phipps aided in refining the origins question. Work there led to the proposition that early Mill Creek predated Old Village Cahokia Mississippian and was likely an outgrowth of local communities including Great Oasis (Henning 1967; Peterson 1967). Henning proposed (ed. 1968, ed. 1969) that those Great Oasis communities who adopted intensive corn agriculture and bison hunting became the Mill Creek (Initial variant) people. Middle Mississippian characteristics as seen in later Mill Creek deposits pointed to contact with Cahokia via trait unit intrusion or diffusion of ideas, but not as an actual population migration (site unit intrusion) (Henning 1969) as earlier researchers had proposed (Griffin 1946).

Kimball Village ceramics have aided in understanding the relationship of the Mill Creek culture sites to other Initial variant phases. Ives (1962:34) noted that ceramics from several sites of the South Dakota Over focus (now reclassified as the Lower James phase minus the Swanson site) differ from the Iowa Mill Creek sites, including 13PM4, in terms of the presence of cord-impressed Foreman and Chamberlain wares, and the absence of seed jars and red-slipped pottery (except at one South Dakota site, Twelve Mile Creek). Alex (1981a) and Tiffany (1983) noted these differences as well, although the affinity between Over focus and Mill Creek is recognized. The greatest similarities to Mill Creek are seen in the Lower James and Brandon phase Initial variant sites in South Dakota (Alex 1981a, 1981b; Tiffany 1983).

Other implications of research included a better understanding of village midden formation processes as occurred at Kimball, Phipps, and at many other Middle Missouri tradition village sites. At Kimball Village, the University of Wisconsin team was somewhat disheartened that ceramics "showed a quite erratic distribution from level to level despite the fact that this is our deepest midden and should best show developmental trends in ceramics" (Bryson and Baerreis 1968:13). While this may be disappointing in

terms of quantifying ceramic trends through time, this pattern of strong vertical mixing does provide valuable data in another sense: this pattern conforms to a "mobility model" of settlement, proposed for the Mitchell Site, an Initial variant site in South Dakota, studied nearly a decade after the University of Wisconsin investigations at Kimball (Baerreis and Alex 1974:146–147). At Mitchell, investigators found a single Initial variant house created a midden 0.9-m (3-feet)-deep, spread over a 9–12-m (30–40-foot)-diameter area. The mobility model suggests that middens with strong vertical mixing formed in several substantial episodes, rather than in long, gradual increments. These moves may have been necessitated due to the reduction in local floral and faunal resources (Tiffany 1982a:51–55). These villages would have been occupied, the inhabitants would move on, then later, reoccupy the same village again, several times over. Sites that lack this vertical mixing imply stable occupation of the site across time, with the midden built through gradual trash disposal and dispersal and other similar mechanisms (Anderson 1973, 1981).

Anderson (1985) argued for a composite model, that these midden villages are the result of several mechanisms, not only refuse disposal and weathering of houses, but also banking of soils along house and/or palisade walls, construction of new houses atop the detritus of the old ones, and pit digging. Although there certainly is variability in midden formation processes from site to site, and even, within a single site, present evidence suggests sequential, not continual, occupation of Kimball Village (Whittaker 2010), although it has been argued that the sample size from the 1963 excavations was simply too small to accurately study the vertical distribution of artifacts (Anderson 1985). While the question of how a more than 7-foot-deep pile of cultural debris and soil accumulated at 13PM4 cannot be answered with certainty at this point, the significance of Kimball Village and its relative lack of disturbance is that it *can aid in answering such questions*, perhaps more so than any other known Big Sioux phase village.

The Keyes-Orr ceramic assemblage from Kimball and Broken Kettle villages, along with 1955 collections from the Little Sioux phase Phipps village site (Ruppé 1955, 1959b), were used by Ives (1962) to establish essential descriptions of Mill Creek pottery. He noted some significant differences in the pottery, which led him to propose a reclassification of the Little and Big Sioux foci as phases. Henning's (1969:268) limited excavations in 1963 lent a modest amount of support to Ives' perceived ceramic differences between the phases. McKusick (1964:193) disagreed, believing the separation between the site clusters was simply geographic, and there was not a significant difference in the pottery and other materials from sites along the two rivers, the Big and Little Sioux. Henning (1969:268), building on Flanders (1960) and Ives (1962) did not dispute that the artifacts from the various Mill Creek sites were very similar; his point was that proportions of various ceramic forms or wares varied over time within a site or varied from site to site, particularly when comparing the Big and Little Sioux sites. At the Little Sioux phase Phipps site, some changes in ware type proportions were noted by both Ives (1962) and Henning (1969:265).

Homogeneity in attributes of a ware type over time is not the same as the proportions of each ware type staying the same over time. Ceramic trends were far less noticeable at Kimball Village. At all the 1963-examined sites, including the midden mound villages of Kimball and Phipps, specific ceramic ware types or

decorative types showed no variation from top to bottom of the midden. Henning (1969:264) cites the example of Mitchell Modified Lip: this type looks the same at the bottom of the midden as it does when found near the later years of site occupation, at the top of the midden. With one exception, a very slight trend toward decreasing rim height for Sanford ware nearer the upper levels of the mounds, there were no obvious changes in rim profiles, lip thickness, orifice diameter, or paste that could be correlated with depth. The implication of this finding was that most known Mill Creek ware ceramic attributes appeared to remain steady throughout the entire Big Sioux phase Initial variant occupation of northwest Iowa.

FUTURE DIRECTIONS

Practical lessons learned from the 1963 Mill Creek Project were offered by Bryson and Baerreis (1968:30) and criticism related to some of these were voiced early on (Butzer 1973). They could have excavated a greater area at each site, particularly in an effort to obtain better large ruminant (cud-chewing animal, such as bison) data. Only large mammal remains have been fully analyzed from the Kimball collections; surely, new information on diet and subsistence would be revealed from a complete faunal analysis. The faunal comparisons that were done as part of the 1963 project had discrepancies between sites in the way proportions of different animal species were counted (Dallman 1983; Lensink 1990, 1991). More flotation samples could have been collected, to provide greater information on gastropods and small animals. Soil samples for pollen analysis should have been larger. Geomorphological (soil formation) processes should have been fully examined, especially on terrace landforms like Kimball Village's.

Henning et al. (1968:104) suggested looking more closely at the proportions of various tool types, such as hoes to projectile points, to gain a better understanding of shifts in economy, movements from agricultural intensification to increasing reliance on hunting, and visa versa. Detailed functional and micro analysis of the stone tool assemblage, including extant collections, should define new tool types and evidence of patterned tool manufacture. No chert sourcing of the Kimball Village materials has occurred. Chemical analysis of ground stone tools could provide evidence of what materials were being processed on their surface, evidence beyond simply crushing and grinding. Henning thought various then-cutting-edge techniques could be put to good use on the 13PM4, and other Mill Creek site, ceramics. He suggested the use of "thin section and petrographic analysis, spectrographic analyses, X-ray fluorescent spectrometry," to name a few (Henning 1969:193). He was especially interested to someday determine the place of origins of the clays, and whether there was evidence of trade in that respect. Some Mill Creek pottery from the 1963 work was sent off for thin-sectioning and petrographic analysis, but was not completed in time for the two associated reports (Henning, ed. 1968, ed. 1969). Recent inquiries suggest no records of this analysis remain (forwarded email communications 2009, between Dale Henning and James Stoltman).

Henning et al. (1968:82) mention they may have excavated through house floors or other features in the upper part of the midden: the three superimposed house floors at 13PM1 suggest this as well. Given that Orr's houses were found in the lower levels of the midden, the 1939 crew also could have missed features.

Henning et al. (1968:82) recommended "a trench five feet in width should be dug from the midden edge into the deepest portion of the [Kimball] site." Using the trench as a guide, natural and cultural levels could be seen with greater ease than in vertical test units, and excavations could then proceed outward from the trench, collecting artifacts by strata, rather than from arbitrary levels. Greater data about midden formation could be acquired in this fashion, and large features might be better identified. The Wisconsin researchers also recommend a trench should be excavated from the mound edge, to see if a fortification ditch was present. Recent site testing (Whittaker 2010) suggests the possibility of internal site stratification and thus the potential for house floors in the upper part of the midden.

Anderson (1985, 1987) recommended more meticulous documentation of midden formation evidence during archaeological excavations at Mill Creek sites, thus allowing for detailed artifact provenience documentation. If sites were excavated in a meticulous fashion, the exact location of individual artifacts within the village midden could be pinpointed. These details should permit identification of dependent variables, which he refers to as "microchange." Examples of microchange include the intensification of subsistence, broadening ideology, and the elaboration of sociopolitical forms. The microchange variables then reflect independent variables "macrochange or prime movers." Independent variables related to the origin of Mill Creek include climate change, specifically, the rise of weather conducive to crop growing; rise of Mississippian culture and the resultant expansion of trade; emergence of new cultigen varieties, especially corn; and regional population increases. Anderson (1987:527) explains:

> These variables influenced the physical, biological, and cultural environmental systems and resulted in the emergence of the distinctive Mill Creek cultural system by A.D. 1000—presumably from a Late Woodland base. Under the proposed model, Mill Creek villages initially were established in favorable locations on the Big Sioux and Little Sioux rivers and their tributaries. From this time forward technological, social, and ideological subsystems directly involved in Mill Creek culture adaptation underwent adjustments. Depending on site locations, this involved either the budding off process (cf. D. Griffin 1976) or relocation of villages due to overuse of locally available resources.

During the Mill Creek occupation, the independent variables shifted to include Mississippian contacts and introduction of exotics, many of which are in evidence at Kimball Village (seed jars, effigy bowls, scroll designs on ceramics); the decline of Cahokia; contacts with South Dakotan Initial variant villages; Oneota expansion; and another climate shift, this time the onset of the Pacific episode.

Many of Anderson's challenges had been or subsequently were addressed by researchers who incorporated the Kimball Village discoveries into broader Middle Missouri studies and publications. These focused on refinements to taxonomy and chronology (Ahler et al. 2007; Henning and Henning 1978; Henning 2001; Johnson 2007; Lensink 1993b, 1997, 1998; Lensink and Tiffany 2005; Tiffany 1982a, 1983, 2007; Toom 1992a, 1992b, 2004; Wood 2001), the origins and development of the Middle Missouri tradition, and the relationship between communities and areas (Alex 1981a-b; Gibbon 1991; Johnson 1991; Tiffany 1982b, 1983; Toom 1992a, 1992b). Reanalysis of existing data, along with new research, have resulted in altered interpretations concerning the relationship between climate and culture change (Butzer 1973; Laird et al. 1996, Laird et al. 2003; Lensink 1993a; Tiffany 1982a; Zalucha 1982), the applicability of radiocarbon

dating (Lensink 1992, 2003a, 2003b), and possible sociocultural processes that explain the origin, development and demise of these first Plains villagers and their interactions with Middle Mississippian communities (Anderson 1987; Benn and Green 2000; Finney 1992; Henning 1971a, 1971b, 1996, 2007; Henning and Henning 1978, 1982; Henning and Toom 2003; Lensink and Tiffany 2005; Pauketat and Loren 2005; Tiffany 1982b, 1987, 1991a, 1991b, 2003b; Tiffany and Alex 2001; Tiffany et al. 1998; Toom 1992b; Winham and Calabrese 1998; Wood 2001).

Since the mid 1960s, Kimball Village has been solidly placed within the Middle Missouri tradition as part of the Big Sioux phase of the Initial variant (Alex 1981a; Tiffany 1982a, 1983). Reassessment of the large mammal remains including those from Kimball (Lensink 1989, 1990, 1991) together with an assessment of the floral analysis conducted by the University of Wisconsin project (Zalucha 1982), and evidence from freshwater diatoms (Laird et al. 1996, 2003), have called into question the climatic model of Bryson and Baerreis and the role (or at least the nature) of climatic change as a prime mover in the origin of Mill Creek. Likewise, the droughty conditions, once thought to have precipitated an exodus of Mill Creek villagers from Iowa prior to A.D. 1300, now also seems unlikely (Henning 2007). Humanly-induced resource depletion and intersocietal conflict are now posited to have been factors in both the Mill Creek settlement model and the disappearance of Initial variant communities from Iowa's archaeological record (Lensink 1989).

Recent recalibration and analysis of radiocarbon dates, many collected by the University of Wisconsin project, indicate a shorter time span for the Mill Creek culture and other early Middle Missouri sites suggesting to some researchers that certain communities formerly thought to have an antecedent–developmental relationship are likely contemporary, and calling into question the use of radiocarbon to date both site duration and periods of rapid culture change (Ahler et al. 2007; Lensink 1993a, 1997, 1998; Toom 1992b). These considerations have had a direct affect on assessing the relationship between Great Oasis, Mill Creek, and Mississippian communities (Henning 1991, 1996, 1998, 2005, 2007; Lensink and Tiffany 2005; Tiffany and Alex 2001; Tiffany et al. 1996). Cross dating of ceramics and diagnostic artifacts has been offered as one way to resolve chronological issues and to correlate developments between Mississippian and Plains village cultures, and Middle Missouri communities themselves (e.g., Alex 1981a, 1981b; Anderson et al. 1979; Anderson and Tiffany 1987; Anfinson 1997; Lensink and Tiffany 2005; Hall and Hall 2003; Johnson 2007; Ludwickson et al. 1993; Tiffany and Adams 1998; Tiffany and Alex 2001; Tiffany 1991a, 1991b; 2003a, 2003b, 2007).

Nondestructive techniques such as those recently applied to Kimball Village (Kvamme 2009) and to other Mill Creek sites (Alex and Lensink 2001; Goodmaster 2007a, 2007b; Lensink and Alex 2008) have produced outstanding views of intact subsurface features suggesting exciting directions for future field research that may verify and identify buried features including existing houses and defensive systems. When combined with more recent estimates of houses and village size (Lensink 2005; Lensink and Tiffany 2005) and a shorter chronology, it may be possible to more accurately estimate population density and community patterning.

While there is no question that Mill Creek and related communities, interacted with the Mississippian world, researchers are exploring the nature of this interaction and its transformative effect on the evolution of Plains village society itself (Tiffany 2007). It is within the rich artifactual assemblages of these communities, as Fugle's (1957) early study of Kimball so beautifully demonstrated, that clues may also be found to the ideological systems of these early communities.

The origin and development of nucleated, fortified and permanent villages, the hallmark of the Middle Missouri tradition itself, rested upon intensive maize production (Lensink and Tiffany 2005). The recent documentation of the only known agricultural field system on the Prairie-Plains border at a Mill Creek site (Gartner 2003; Lensink and Alex 2008) together with recent Mill Creek paleoethnobotanical studies (Blake and Cutler 2001; Jones 1993; Nepstad-Thornberry 1998) and soil analysis (Plummer 2006) offer new prospects for understanding the economic system of these communities upon which their societal reorganization took place. Taken together, villages like Kimball, nearby community cemeteries, and other features such as agricultural field systems, provide a view of a new, domesticated landscape hitherto unseen in the deep history of the Prairie-Plains (Roper 2007).

These remain ongoing, exciting research issues that can be addressed through study of the existing documentation, while coupling "deductively oriented research designs" with focused new investigations at the better preserved Mill Creek sites, like Kimball Village (Anderson 1987:529, 531). Big Sioux phase research questions are presented in Alex and Peterson (2010:27–30), and reproduced on pages 31–34 of this Kimball Village nomination.

AREAS OF SIGNIFICANCE

Kimball Village's areas of significance include:

- ARCHEOLOGY / prehistoric
  - for its known and potential research value, particularly with regard to the interaction between climate and culture; innovations in technology and subsistence practices; and the refinement of the chronology of the Late Prehistoric period .
- ETHNIC HERITAGE / Native American
  - for its ability to provide information on the lifeways of peoples of the Initial variant of the Middle Missouri tradition, especially with regard to contact between cultures, the establishment of tribal identities, the relationship between Late Prehistoric peoples and modern tribes, and ceremonialism.
- COMMUNITY PLANNING AND DEVELOPMENT
  - for its ability to shed light on village planning practices, especially on topics of nucleation of communities, settlement behavior, inter- and intra-site variability, and the origins of the Plains Village pattern.

CRITERION D AND REGISTRATION REQUIREMENTS

Our understanding of the Big Sioux phase of the Initial variant of the Middle Missouri tradition is greatly enhanced through the examination of archaeological remains at Kimball Village. As presented by Alex and Peterson (2010) in the MPFD *Archaeological Resources of the Initial Variant of the Middle Missouri Tradition in Iowa*, for properties to be considered for nomination under Criterion D to the National Register of Historic Places under the historic context, *Big Sioux phase, A.D. 1100–1250*, villages and mortuary facilities must demonstrate they possess all of the following criteria, keeping in mind that future research may expand the geographical area and refine the chronological age:

1. Location within the defined geographic area.
2. Big Sioux phase age.
3. Research potential.
4. Integrity.

The Kimball Village site meets all these requirements as set forth in the MPDF.

1. Location within the defined geographic boundaries

Kimball Village, in Plymouth County, is within the MPDF's defined geographic boundaries of Buena Vista, Cherokee, O'Brien, Plymouth, and Woodbury counties.

2. Big Sioux phase age

Ceramic sherds of Sanford, Chamberlain, and Foreman wares, and the Mill Creek ceramic group found during both the 1939 and 1963 excavations at Kimball Village confirm a Big Sioux phase affiliation. Mill Creek and Chamberlain were the most common, comprising more than 75 percent of all wares identified from the Bryson and Baerreis (1968) work. Radiocarbon dates, as recalibrated by Lensink (2009), indicate the site was occupied during the Big Sioux phase, A.D. 1100–1250 period.

3. Research potential

There is no indication this location was occupied by an earlier group, nor was it reoccupied by a later group. All evidence demonstrates this site has a single Big Sioux phase component, dating sometime between A.D. 1100–1250. Single-component archaeological sites possess high degrees of significance for understanding past lifeways, due to the absence of mixing soil disturbance from other occupations. The single component Kimball Village has exceptional integrity and research potential that has never been diminished by occupation by another group.

Archaeological investigations at Kimball Village reveal that only a small part of this site has been disturbed; archaeological investigations at the intact areas of the site, coupled with reanalysis of existing artifact collections, have immense potential to yield significant new data about a host of issues relating to local Late Prehistory, regional issues of Initial variant cultures, and the greater trends in the Middle Missouri tradition. Given the site's astonishingly rich artifact assemblage, dense midden, and well preserved features, including houses and their related hearths, storage pits, and activity areas; mortuary facilities; and a probable palisade, Kimball Village will provide data that aid in answering all essential research questions presented in Section E of the *Big Sioux phase, A.D. 1100–1250*, context (Alex and Peterson 2010:25–28). These questions are as follows:

Origin of the Plains Village pattern

1) What is the nature of the transition of Great Oasis to Mill Creek? Big Sioux phase sites are in the largest cluster of Great Oasis sites in the Midwest. Big Sioux phase sites are singular for examination of the apparent rapid transition from Great Oasis to Mill Creek locally and regionally. This can be tested and evaluated by ceramic assemblages and radiocarbon dates from house floors and pits in those floors primarily with data available in curated collections or attainable from further excavation.
2) Both a) the increasing success of agricultural reliance on domesticates corn, squash, and the North American small seed complex, and b) the rapid increase in trade relations with Mississippian centers during the Cahokian Lohmann phase, have been implicated as the exogenous variables for the appearance of the Plains Village pattern among eastern Initial variant sites like those of the Big Sioux phase. The Big Sioux phase and its associated Great Oasis sites offer the opportunity to address the question of which of these two variables was the more significant causative factor.

Interaction between climate and culture

1) The climatic model of the 1960s has been thrown into question by more recent research. Is it possible to utilize paleoenvironmental data from Big Sioux phase sites and nearby Great Oasis sites to address the causative role of climate in the transition to nucleated village life?
2) The abandonment of the Big and Little Sioux phases remains largely uninvestigated. Did climate play a role in this abandonment?

Nucleation and fortification of communities

1) Recent geophysical survey has shown the potential to determine whether Big Sioux phase sites altered by cultivation display evidence of fortification. It is sometimes assumed that all or most Mill Creek sites were fortified. Data from geophysical survey at other Big Sioux phase villages clarifying whether these sites are fortified would allow the question to be addressed as to why some villages are fortified and others are not.
    a. While the geophysical survey has already been completed at Kimball Village, this data will be used as a baseline comparison with other Big Sioux phase sites.

2) We currently have no conclusive evidence that any Great Oasis site was fortified. The transition from Great Oasis to Mill Creek appears to be a transition to tightly nucleated and fortified communities. Why did fortification become necessary with the establishment of the IMMT Big Sioux phase?
3) What does nucleation and fortification say about the emerging sociopolitical organization of Initial variant communities and their external contacts?

Establishment of tribal identities

1) Big Sioux sites have produced the bulk of documented human remains from Mill Creek sites. These data indicate an affiliation with Coalescent/Arikara populations and culture history and not the Extended to Terminal Middle Missouri tradition sequence of the Mandan in particular and Hidatsa in general. Could additional work conducted on the cranial data assembled from the Big Sioux phase Siouxland Sand and Gravel and Spirit Knoll sites be used to evaluate hypotheses concerning the affiliation of Initial variant skeletal materials with either the Coalescent or Middle Missouri descendant populations?
    a. Human remains have been identified from several locations within Kimball Village, and that data may also aid in answering this question.
2) What are the factors that brought about the transformation of Late Woodland cultures from loosely aggregated band-level groups into weakly ranked tribal societies as evidenced by Big Sioux phase sites?
3) Corroborative material culture present in extant collections on the Anoka focus and St. Helena focus at the Nebraska State Museum should be fully reevaluated especially in light of the long-standing published observations on Grey Cloud Horizontal Incised, an Initial Coalescent variant pottery type with clear affinities to Great Oasis/ Chamberlain wares. Would such an analysis provide evidence for ceramic continuity from Mill Creek to Initial Coalescent (Tiffany 2007; Caldwell and Jensen 1969)?
    a. Baseline artifact data from Kimball Village would be used in any such comparative analysis.

Expansion and intensification of Mississippian contact and influence on the Prairie Peninsula

1) The Big Sioux phase sites are rich in evidence for Mississippian contact and influence. What is the nature of this contact?
2) Is there quantifiable evidence from Big Sioux phase sites to support Tiffany's (1991a) model of "meat for the elite?"
3) Utilizing new material sourcing techniques including ceramic thin sectioning, can the origin of non-local items found in Big Sioux phase sites be sourced thus offering clues to the direction and intensity of Mississippian contact and influence on the Prairie Peninsula?

4) Many of the research questions pertaining to Mill Creek and the Plains Village tradition generally deal with the contact and interaction among local and non-local peoples. There are few extant reports on Great Oasis, Mill Creek, and Middle Missouri human skeletal remains, but there are data on Mississippian populations. Nevertheless, these data, and the results of recent data recovery at a Big Sioux phase cemetery (Spirit Knoll), could be thoroughly examined prior to reburial per Iowa law and NAGPRA consultation. Such analysis would (a) assist in answering questions regarding the relationship between Mill Creek populations and their likely precursors, (b) identify biological relationships among Mill Creek and other Initial variant of the Middle Missouri tradition and Coalescent populations, and (c) determine potential affiliation with Mississippian peoples. Non-local individuals (e.g. Mississippians) may be identifiable using comparative cranial studies and stable isotope analyses. Results could provide new information to answer the question, where did Mill Creek go?

Ceramics and food: storage, consumption, and ceremonialism

1) Higher percentages of certain pottery styles at particular villages such as Kimball and Broken Kettle may suggest the nature of the Initial variant residence pattern. Can calculating the volume of ceramic vessels and data on storage pits at the Big Sioux phase sites lead to estimates of storage capacity, food consumption, and ultimately to Big Sioux phase demographics?
2) Were certain Mill Creek ware vessels from Big Sioux phase sites such as bowls and seed jars used in ceremonial feasting activities similar to the feasting activities proposed for Mississippian sites?

Artifacts as reflections of ideological systems

1) Much has been written about the ideological underpinnings of motifs found on Mississippian ceramics and other "special" artifacts. What portions of the Mississippian ideological system are imported into Initial variant society along with the characteristic motifs found on ceramics and other special trade items?
2) Do the presumed symbolic items in Big Sioux phase sites represent the products of a messianic movement resulting from a new type of contact with Mississippian culture(s)?

Length of occupation and duration of early Middle Missouri tradition communities

1) The occupation and duration of early Middle Missouri tradition communities have been the subjects of considerable discussion especially with the review of the radiocarbon data and its limitations. The shortening of the Initial variant chronology has implications for the length of occupation of villages. What factors affected the duration of village occupation which is now believed to have ranged from as little as one year to as many as seventy years?
2) Assuming that villages were relocated, what factors affected the frequency of relocation and the position of villages on the landscape?

Intensification of agriculture

1) Intensive, corn-based (maize) agriculture is considered a hallmark of the Plains Village pattern. To date, while Big Sioux phase sites are believed to reflect this pattern, detailed paleobotanical analysis of site materials is relatively minimal. Would comprehensive analysis of extant and new collections provide information to support intensive agriculture as one factor in the longer duration of occupation argued for the Big Sioux phase sites (Lensink 2003a)?

2) Big Sioux phase sites contain paleobotanical remains of corn, subfloor storage pits, and cultivation implements—all associated with intensive agriculture. Similar evidence may be found in Great Oasis communities. Are there measurable differences in the type and quantity of domesticated species between Mill Creek and Great Oasis that suggest Mill Creek people were practicing a different agricultural pattern that might account for changes in community structure such as nucleation and defense, and expansion and interaction with outside communities?

Prehistoric landscape

1) Big Sioux phase midden-mound villages, such as Kimball, exhibit evidence of numerous houses likely enclosed in defensive palisades and positioned on riverine and creek terraces near major confluences. They appear to be associated with community cemeteries situated in the nearby uplands. Combined with other site types, including agricultural field systems and fish weirs as known from Little Sioux phase sites, Mill Creek communities reflect the creation of a new, domesticated landscape hitherto unseen in the deep history of the Prairie-Plains (Roper 2007). Could application of technologies, such as geophysical survey or high precision mapping (LiDAR and Total Station), confirm other associated site types in the Big Sioux locality, and when combined with source analysis of site resources, provide evidence to map out the prehistoric landscape?

Overall, further investigations at Kimball Village can provide answers to these, and more, research questions relating to national, statewide, and local issues of late prehistory.

4. Integrity

Alex and Peterson (2010:39, 46) note that for village and mortuary sites

> of the Big Sioux phase, integrity of location, materials, and association are of primary importance when nominating sites under Criterion D. Integrity of design, setting, workmanship, and feeling can also add to the site's integrity, although they are not critical aspects in this context. A plowed site can retain sufficient integrity if it has discernible activity areas or patterning associated with the period of significance and if it possesses good integrity of setting, materials, and association.

Kimball Village possesses excellent integrity of all seven aspects of integrity: location, materials, association, design, setting, workmanship, and feeling.

Location: Kimball Village's integrity of *location* is excellent. The site remains at its original location, where it was constructed by Big Sioux phase peoples. The site does not contain secondary or redeposited materials.

Materials: Kimball Village possesses excellent integrity of *materials*. Under Criterion D, "integrity of materials is usually described in terms of the presence of intrusive artifacts/ features, the completeness of the artifact/feature assemblage, or the quality of artifact or feature preservation" (National Park Service 2000:41). There are no intrusive artifacts or features; the artifact and feature assemblage is complete; and the quality of artifact and feature preservation is outstanding.

Association: The integrity of the site's *association* is excellent. The National Park Service (2000:42) notes that, "under Criterion D, integrity of association is measured in terms of the strength of the relationship between the site's data or information and the important research questions." Kimball Village contains stratified archaeological deposits that contain intact features and artifacts, all of which aid in answering questions on Initial variant research topics as listed previously in Section 8. There is a strong association between Kimball Village's information and these research questions.

Design: Design brings to mind architectural plans, but it can also apply to the layout of villages. With its organized house rows and surrounding palisade, Kimball Village retains a high degree of integrity of *design*. The original village design remains intact at the site, as evidenced by geophysical survey.

Setting: The *setting* of Kimball Village is excellent. Setting may include elements such as "topographic features, open-space, views, landscapes, vegetation, manmade features (e.g., paths, fences), and relationships between buildings and other features" (National Park Service 2000:36). The topographic features and position of Kimball Village is the same setting as during late prehistory: the village sits on a Big Sioux River terrace, adjacent to the Loess Hills, south of the confluence of the river and Broken Kettle Creek. Also, the relationship of Kimball Village to two mortuary sites (Spirit Knoll and the Kimball Burial, 13PM248 and 13PM23) remains the same now as prehistorically. These two Initial variant mortuary facilities are in the Loess Hills, roughly 600 m east of Kimball Village. A person standing at Kimball Village can still look to the east and see the two burial grounds. The one major change, that the village is now a cultivated farm field, would not necessarily preclude its recognizability to its Big Sioux occupants, were they to revisit the site today.

Workmanship: Kimball Village possesses excellent integrity of *workmanship*. The site reflects the Big Sioux phase artisan's labor and skill in constructing earthlodges, a palisade, hearths, and storage pits. Not only is architectural construction expertise reflected in the archaeological features at the site, but true artistic skill is shown in staggering abundance from the site's artifacts, which include delicately carved shell, highly worked bone, and elaborately decorated pottery.

Feeling: Kimball Village possesses good integrity of *feeling*. As mentioned in the integrity of setting discussion, standing on the site today, a sense of the sweeping vista to the river, close proximity to the Loess Hills and the Initial variant mortuary facilities, coupled with the general lack of modern development nearby all contribute to a feeling of late prehistoric times past.

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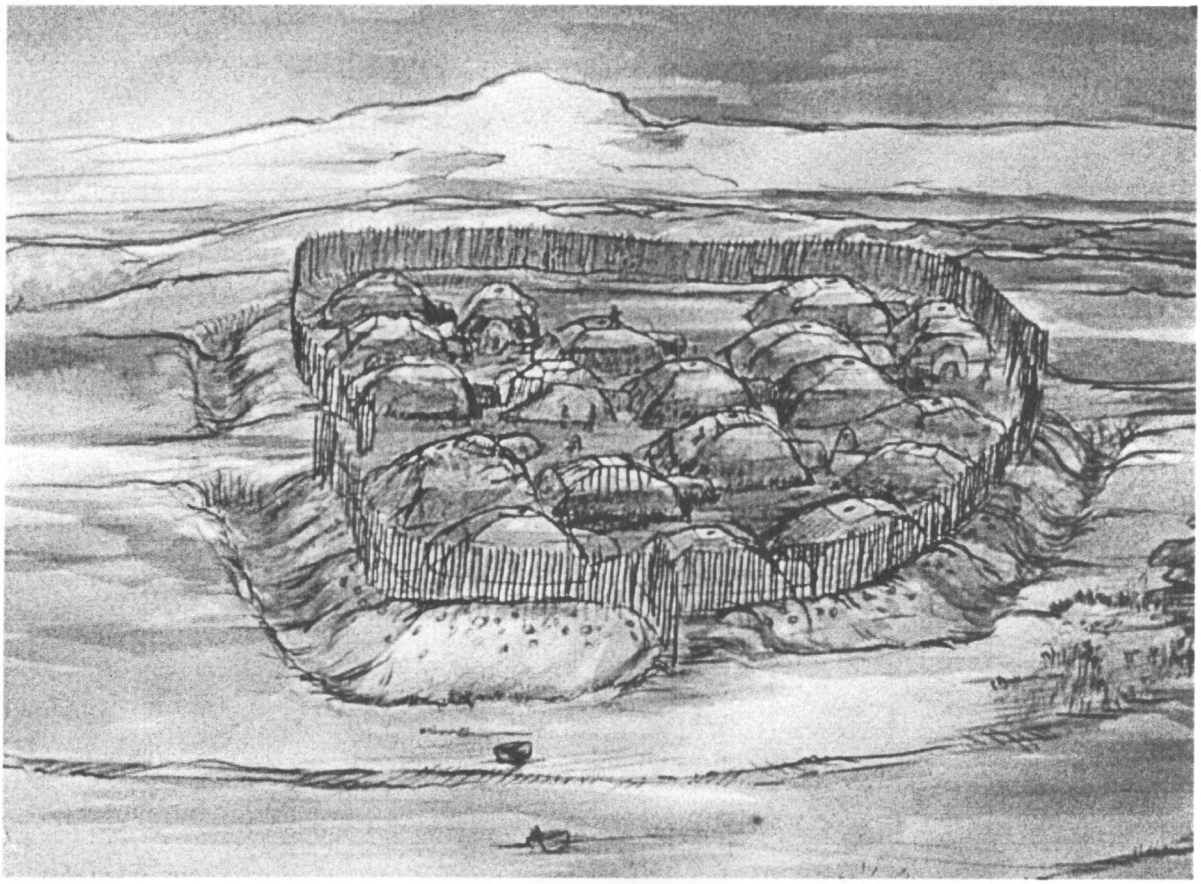

Figure 1. Reconstruction of Wittrock village (13OB4), a fortified Little Sioux phase village in O'Brien County, similar to Kimball Village in layout (from McKusick 1973).

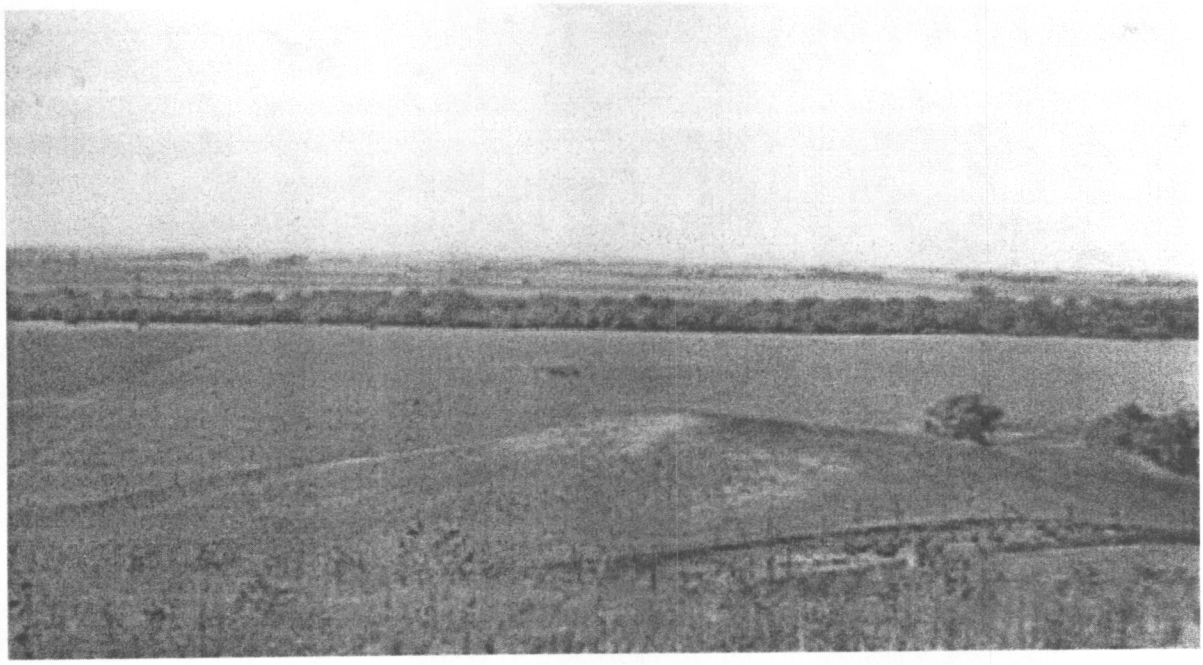

Figure 4. Photograph of Kimball Village in 1939 (from Orr 1942:91). Caption reads: Looking west from hill east of the Kimball Mound at ¼ mile. Timber belt along the Big Sioux across the center of the picture, back of which is the flood plain of the Missouri river and Big Sioux in S. Dakota. Note mound excavation in the center of the corn field.

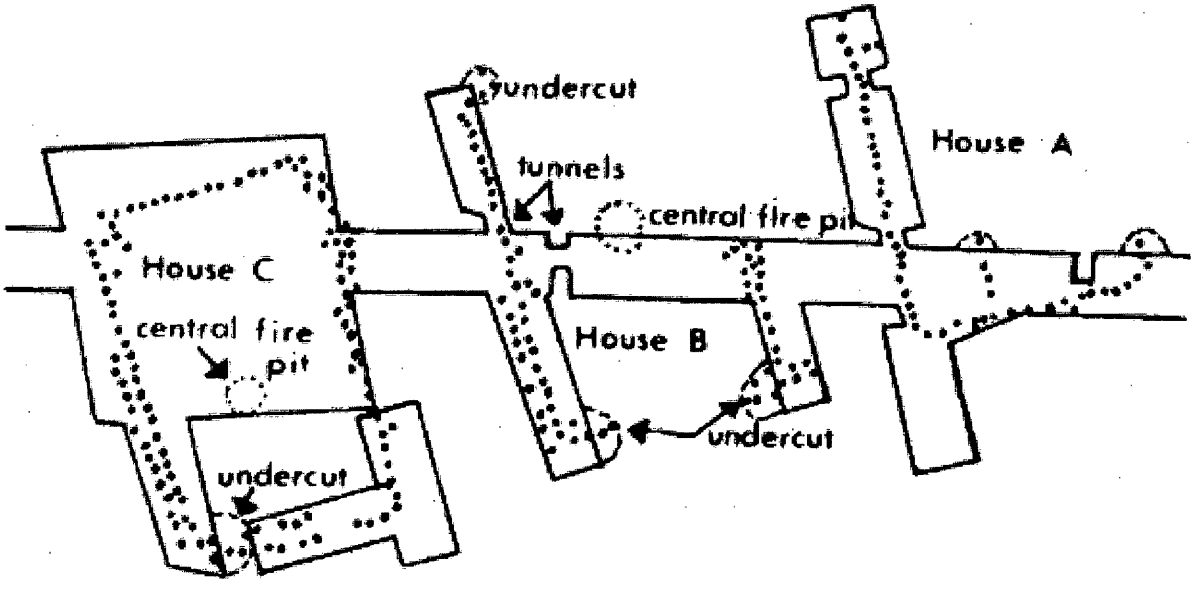

Figure 5. Orr's detail map of feature locations at Kimball Village (redrawn from Orr 1942; slightly cropped). "Tunnels" refers to WPA walkways.

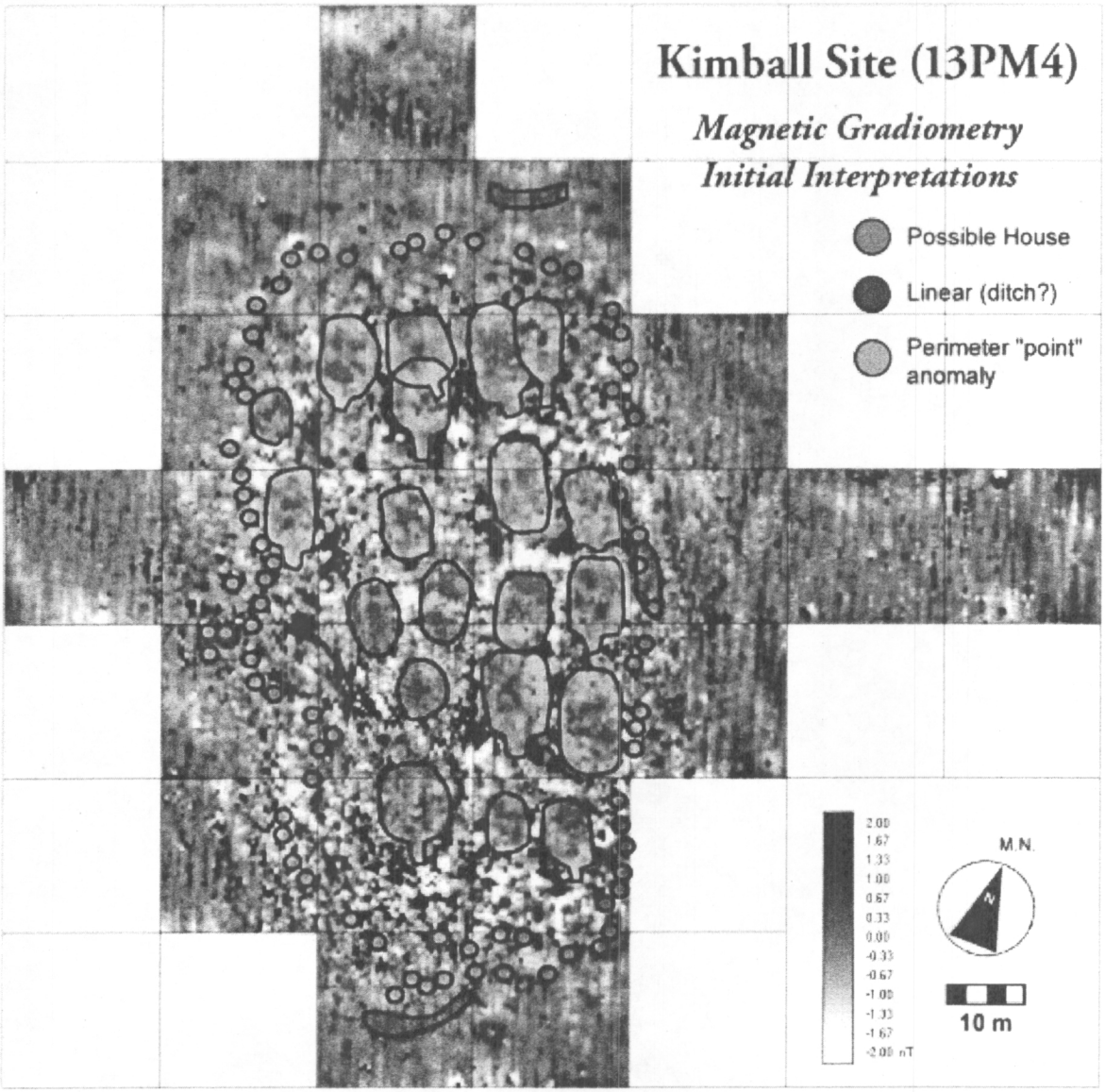

Figure 6. Magnetic gradiometry map depicting probable house features at Kimball Village (initial interpretations from Kvamme 2009:7).

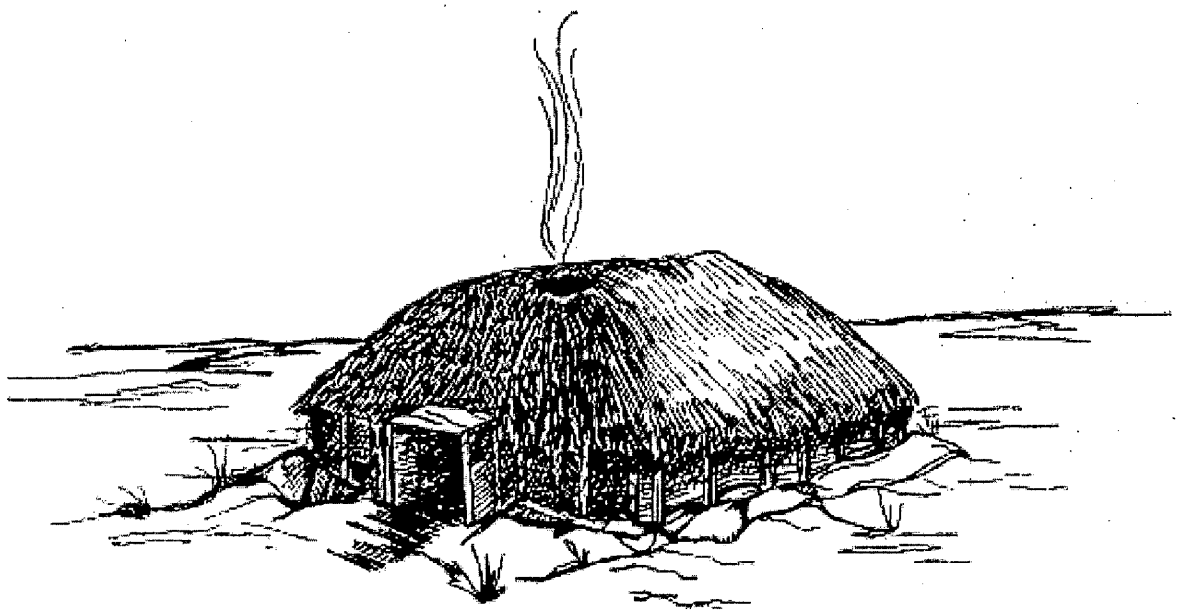

Figure 7. Artist's reconstruction of a type of Initial variant lodge that might have been present at Kimball Village (from Alex 1980:130).

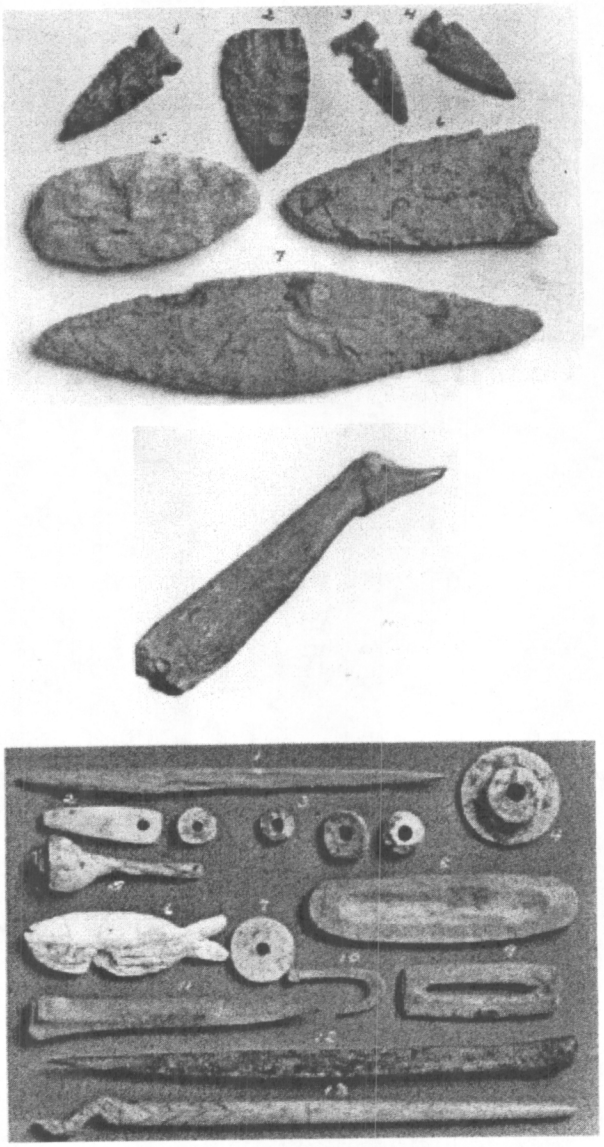

Figure 8. Photographs of select non-ceramic artifacts from 1939 excavations at Kimball Village (composite from Orr 1942:102, 111, 110). Paraphrased captions. Top: Assorted chipped stone tools, including projectile points and knives. Center: Crane effigy carved from elk antler tine, from Storage Pit 1 in House C. Bottom: 1. Double-end perforator 2. Bone pendant 3. Four bone beads 4. Ear ornament 5. Marine shell ornament 6. Fish-shaped ornament made from clam shell 7. Bone bead 8. Fish hook blank, made of bone 9. Bone for making fish hooks 10. Bone fish hook 11 and 12. Bone awls 13. Half of a hair pin.

Figure 9. Photographs of select ceramics from 1939 excavations at Kimball Village (from Orr 1942: clockwise from top left, page 108, 109, 146, 113). Top left: "Rope Fillet" (Ives 1962:25, 58) and Sanford Plain with Mississippian design motifs on the shoulder—a common form of local imitation of Mississippian styles on Initial variant Pottery. Top right: Assorted Mill Creek ware items: 1. Ladle 2 and 3. Bird effigy handles 4. Miniature pot 5. Human effigy handle 6. Raccoon effigy lug or handle. Bottom right: Foreman Incised Triangle rim. Bottom left: Nearly complete Chamberlain Incised Triangle vessel.

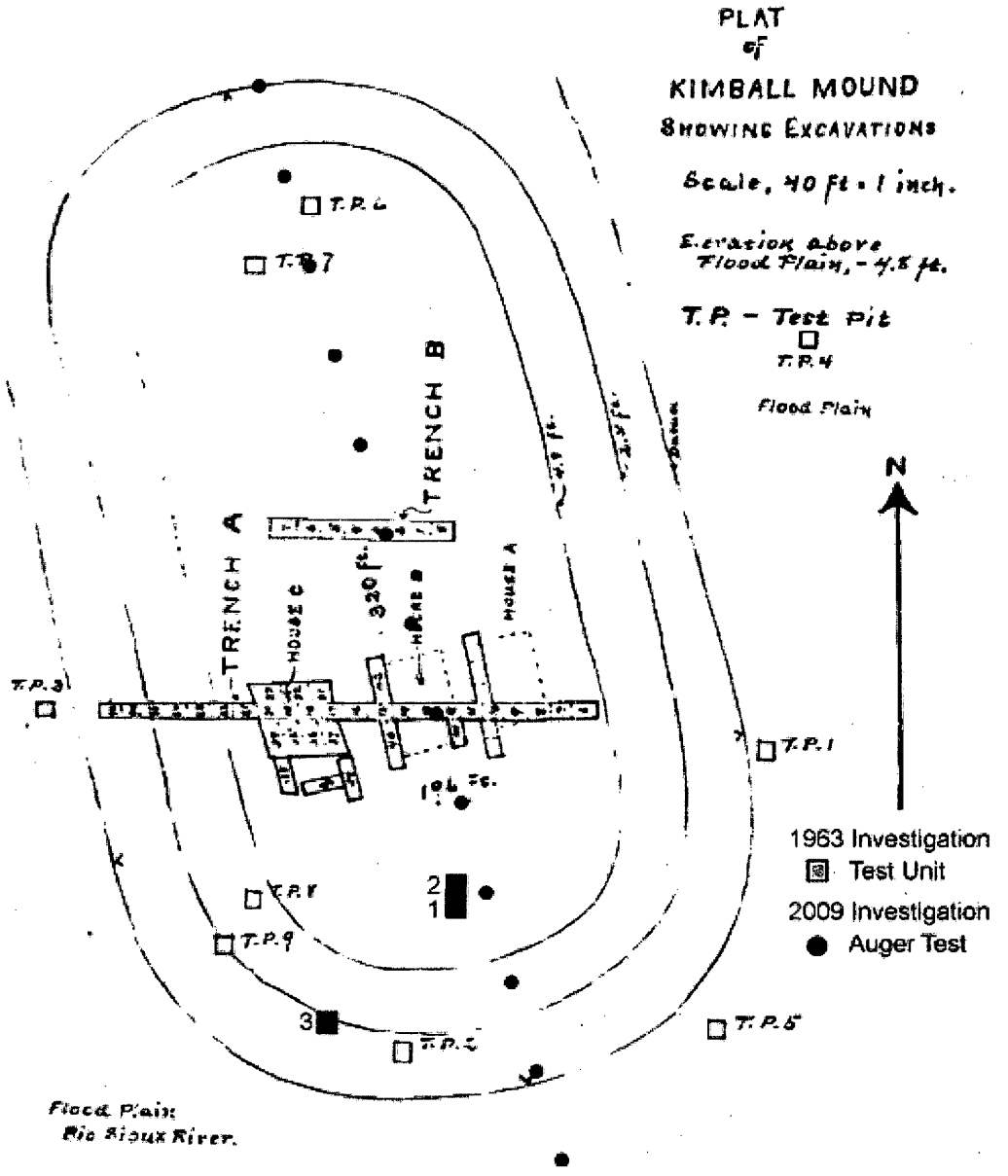

Figure 10. Sketch map depicting locations of archaeological excavations at Kimball Village (base map modified from Orr 1942:118). Location of Orr's 1939 trench excavations, comprising the bulk of the work (labeled with a number; Orr 1942), excavations in 1963 (three test units; Bryson and Baerreis 1968), and the 2009 auger tests (dark circles; Whittaker 2010). Kvamme's (2009) geophysical survey covered the entire site.

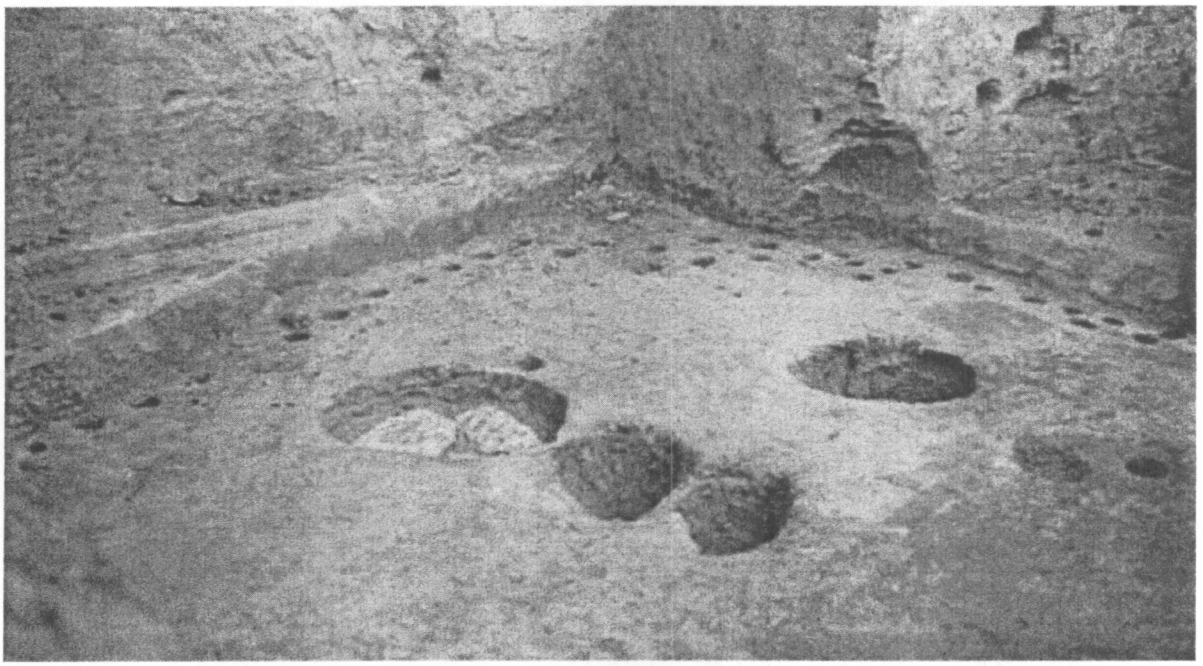

Figure 11. Photograph of post molds and pit features at House C, Kimball Village, in 1939 (from Orr 1942:102). Caption reads: Storage-refuse pit in House C. Looking northeast. Note top of gumbo-like soil in north trench wall at left with stratification above.

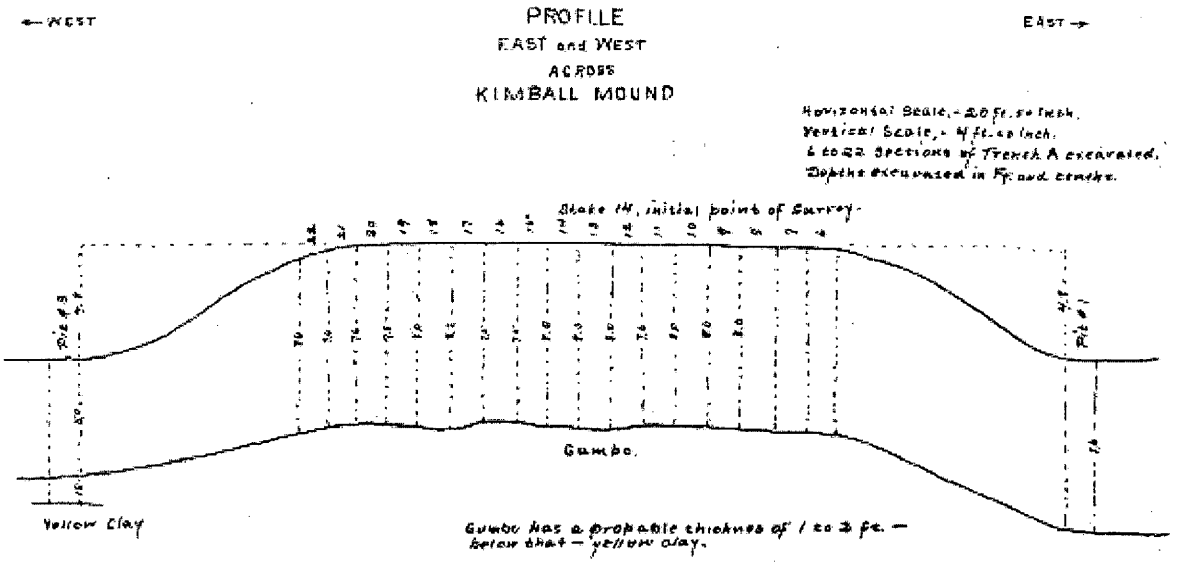

Figure 12. Orr's cross-section map of Kimball Village (from Orr 1942). This profile shows the depth of cultural materials, measured in feet, across the width of the site, from east-to-west.

List of Photographs

Ink and Paper Combination: Epson UltraChrome pigmented inks on Epson Premium Luster Photo Paper.

Photo 0001:
Kimball Village
Plymouth County, Iowa
William Whittaker Photo
March 17, 2009
Image archived at the Office of the State Archaeologist, University of Iowa, Iowa City.
General view of Kimball Village. Elevational rise where people are standing is the highest portion of the midden mound village. View toward North.
IA_PlymouthCo_InitialVariantMPD_KimballVillage_0001.tif

Photo 0002:
Kimball Village
Plymouth County, Iowa
William Whittaker Photo
March 17, 2009
Image archived at the Office of the State Archaeologist, University of Iowa, Iowa City.
General view of Kimball Village. Loess Hills in background. View toward Northeast.
IA_PlymouthCo_InitialVariantMPD_KimballVillage_0002.tif

Photo 0003:
Kimball Village
Plymouth County, Iowa
William Whittaker Photo
March 17, 2009
Image archived at the Office of the State Archaeologist, University of Iowa, Iowa City.
General view of Kimball Village. Standing at edge of highway County 12. View toward West.
IA_PlymouthCo_InitialVariantMPD_KimballVillage_0003.tif